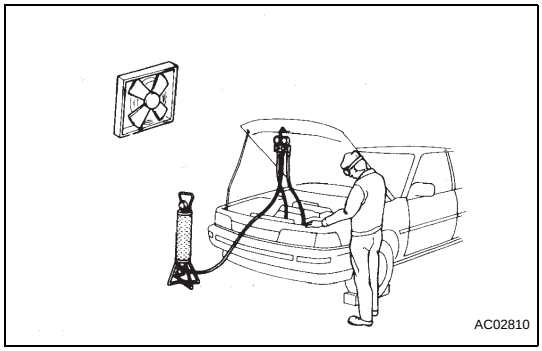
AIR CONDITIONING SYSTEM (for Manual Air Conditioning System)

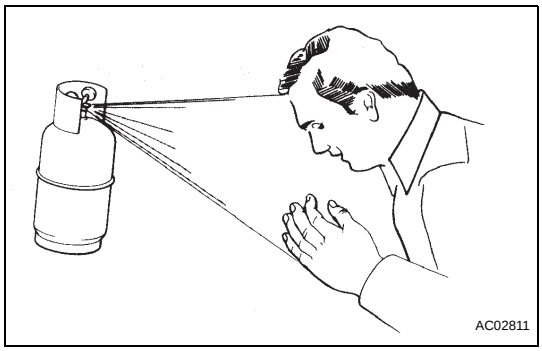
PRECAUTION

1. **IF ANY OF FOLLOWING CONDITIONS ARE MET, KEEP ENGINE IDLING WITH A/C ON (ENGINE SPEED AT LESS THAN 2000 RPM) FOR AT LEAST 1 MINUTE:**
   - Refrigerant gas has been refilled or A/C parts have been replaced.
   - A long time has elapsed since the engine was stopped.

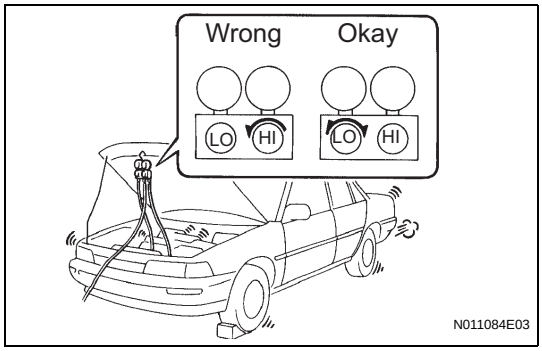
   NOTICE:
   If the engine speed exceeds 2,000 rpm, the A/C compressor may be damaged.



2. **DO NOT HANDLE REFRIGERANT IN ENCLOSED AREAS OR NEAR OPEN FLAMES**
3. **ALWAYS WEAR EYE PROTECTION**



4. **BE CAREFUL NOT TO GET LIQUID REFRIGERANT IN YOUR EYES OR ON YOUR SKIN**
   If liquid refrigerant gets in your eyes or on your skin:
   (a) Wash the area with lots of cold water.
   CAUTION:
   Do not rub your eyes or skin.
   (b) Apply clean petroleum jelly to the skin.
   (c) Go immediately to a physician or hospital for professional treatment.
5. **NEVER HEAT CONTAINER OR EXPOSE IT TO OPEN FLAME**
6. **BE CAREFUL NOT TO DROP CONTAINER OR SUBJECT IT TO PHYSICAL SHOCKS**



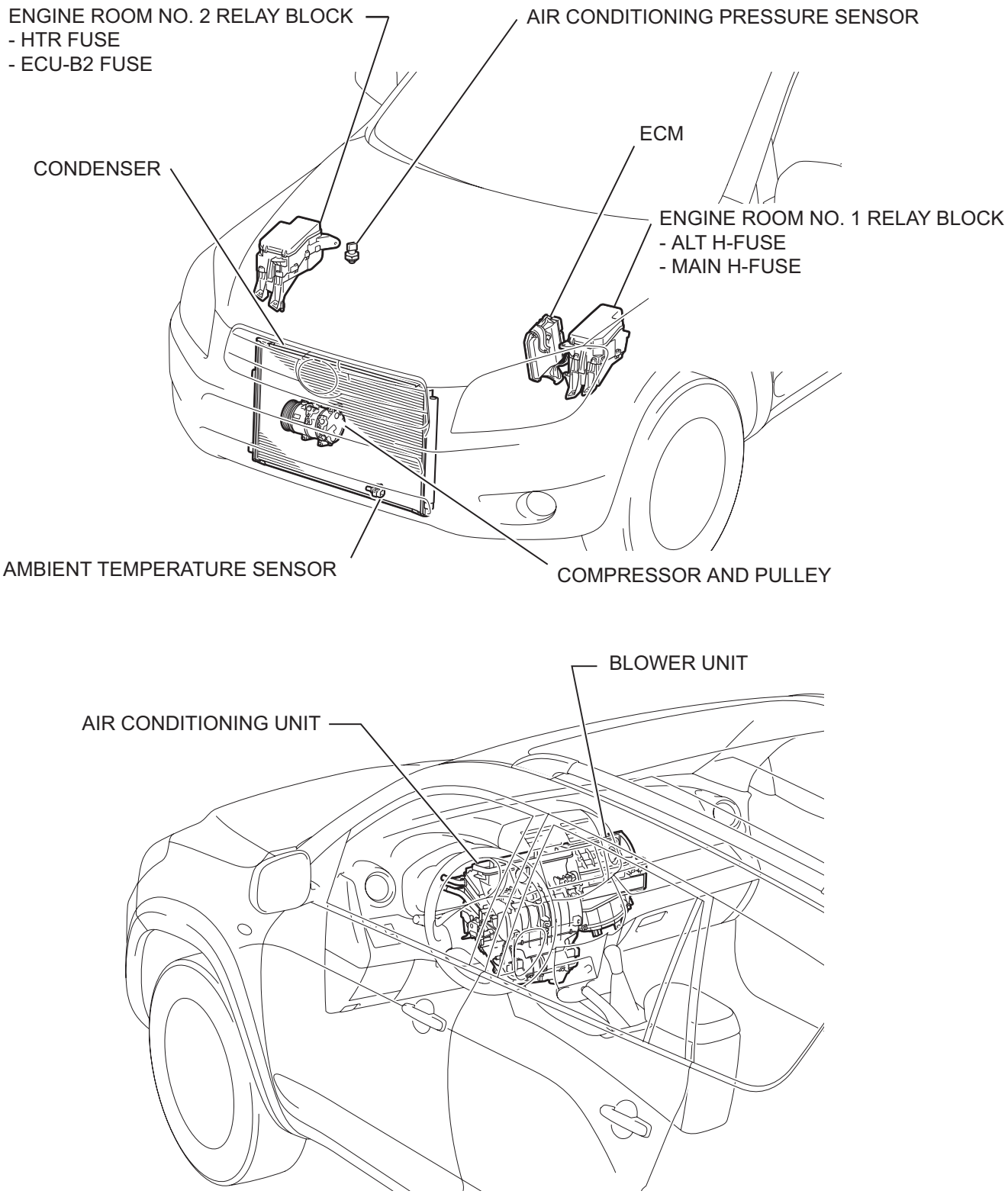
7. **DO NOT OPERATE COMPRESSOR WITH INSUFFICIENT REFRIGERANT IN REFRIGERANT SYSTEM**
   If there is not enough refrigerant in the refrigerant system, oil lubrication will be insufficient and compressor burnout may occur. Necessary care should be taken to avoid this.
8. **DO NOT OPEN HIGH PRESSURE MANIFOLD VALVE WHILE COMPRESSOR IS OPERATING**
   Open and close only the low pressure valve. Opening and closing the high pressure valve could cause the charging cylinder to rupture.

AC

9. **BE CAREFUL NOT TO OVERCHARGE SYSTEM WITH REFRIGERANT**
   If the refrigerant is overcharged, it causes problems such as insufficient cooling, poor fuel economy and engine overheating.
10. **DO NOT OPERATE ENGINE AND COMPRESSOR WITHOUT REFRIGERANT**
    NOTICE:
    This may damage the inside of the compressor.

PARTS LOCATION

(2005/11-2006/01)



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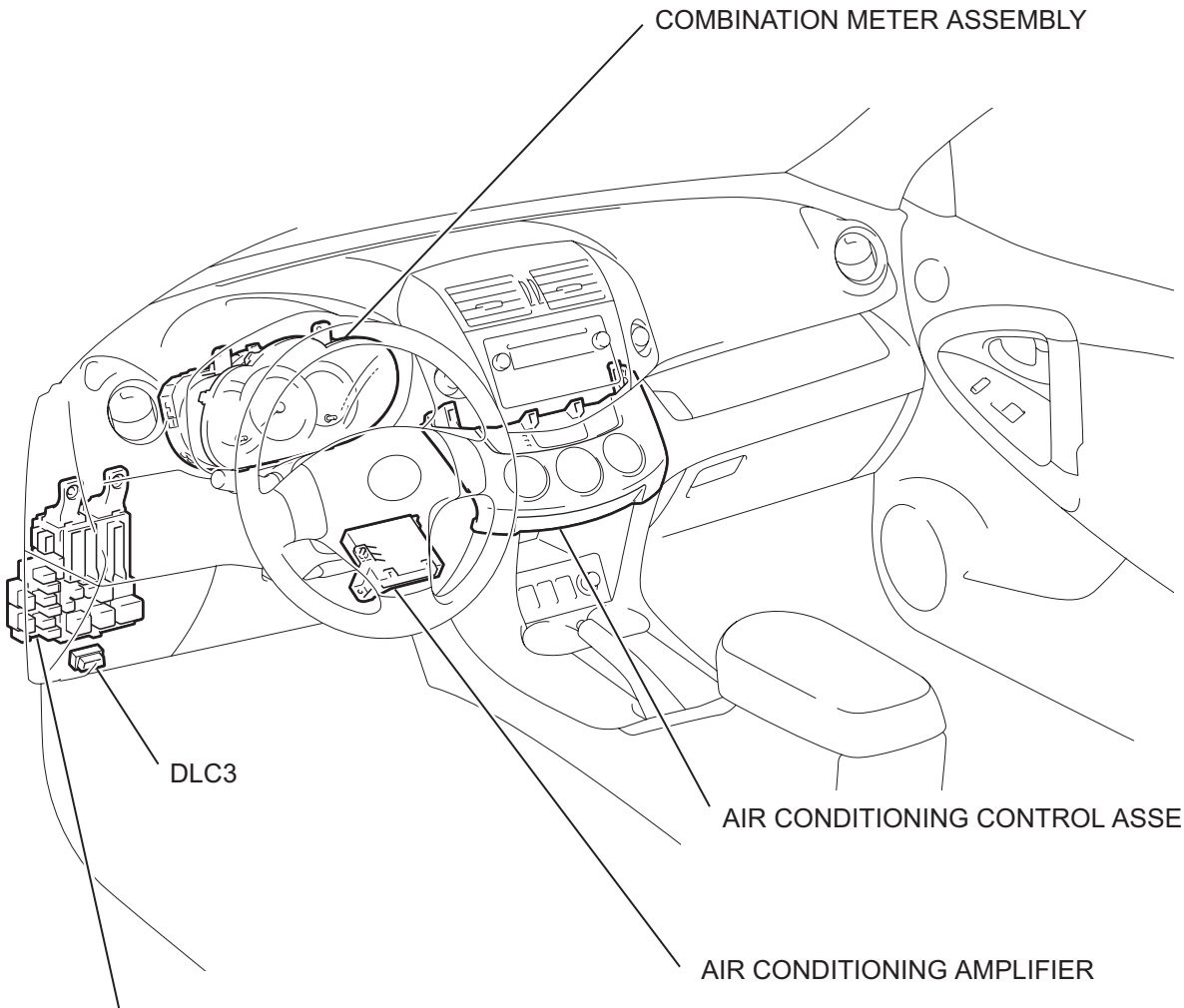

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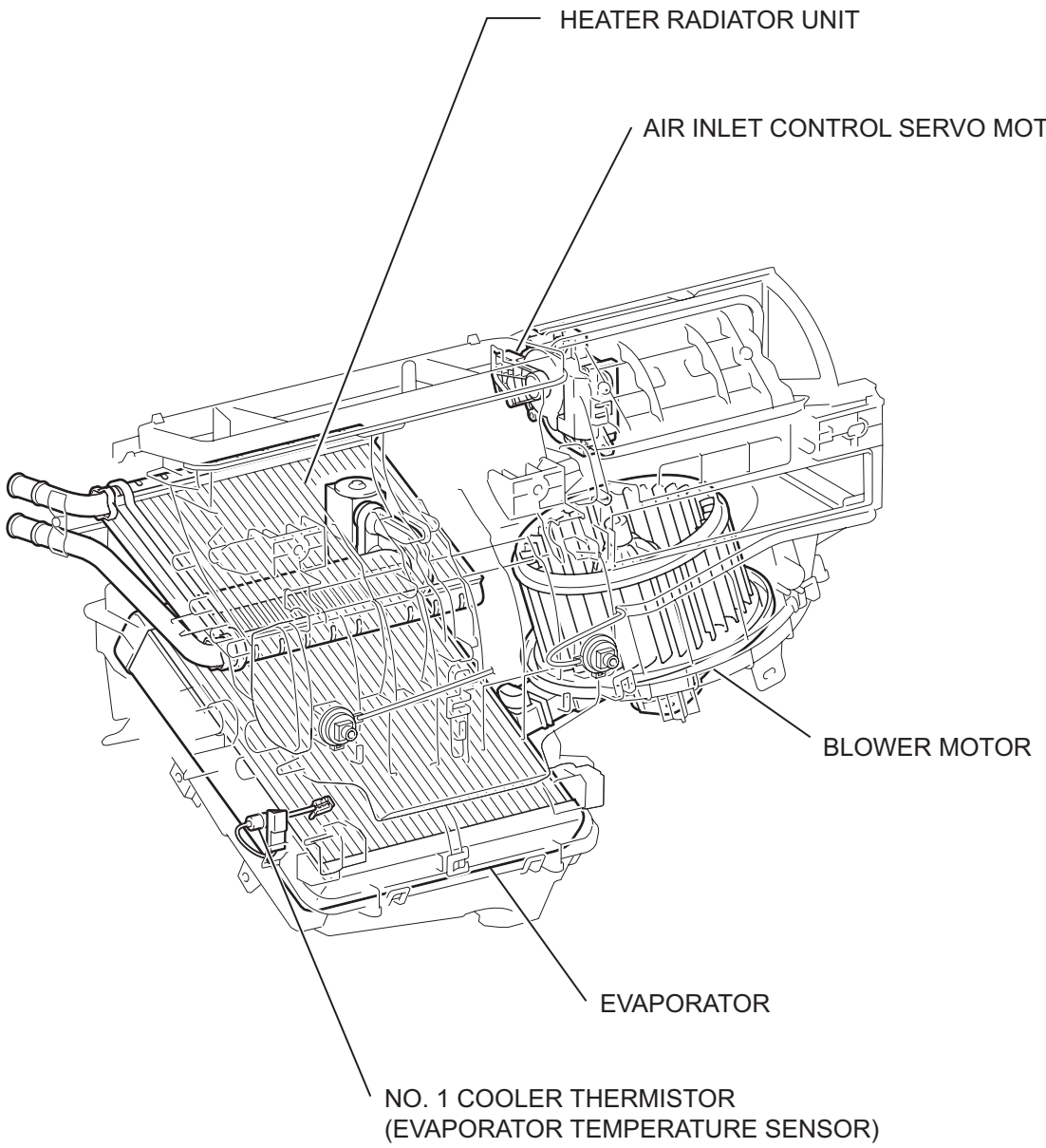

AC

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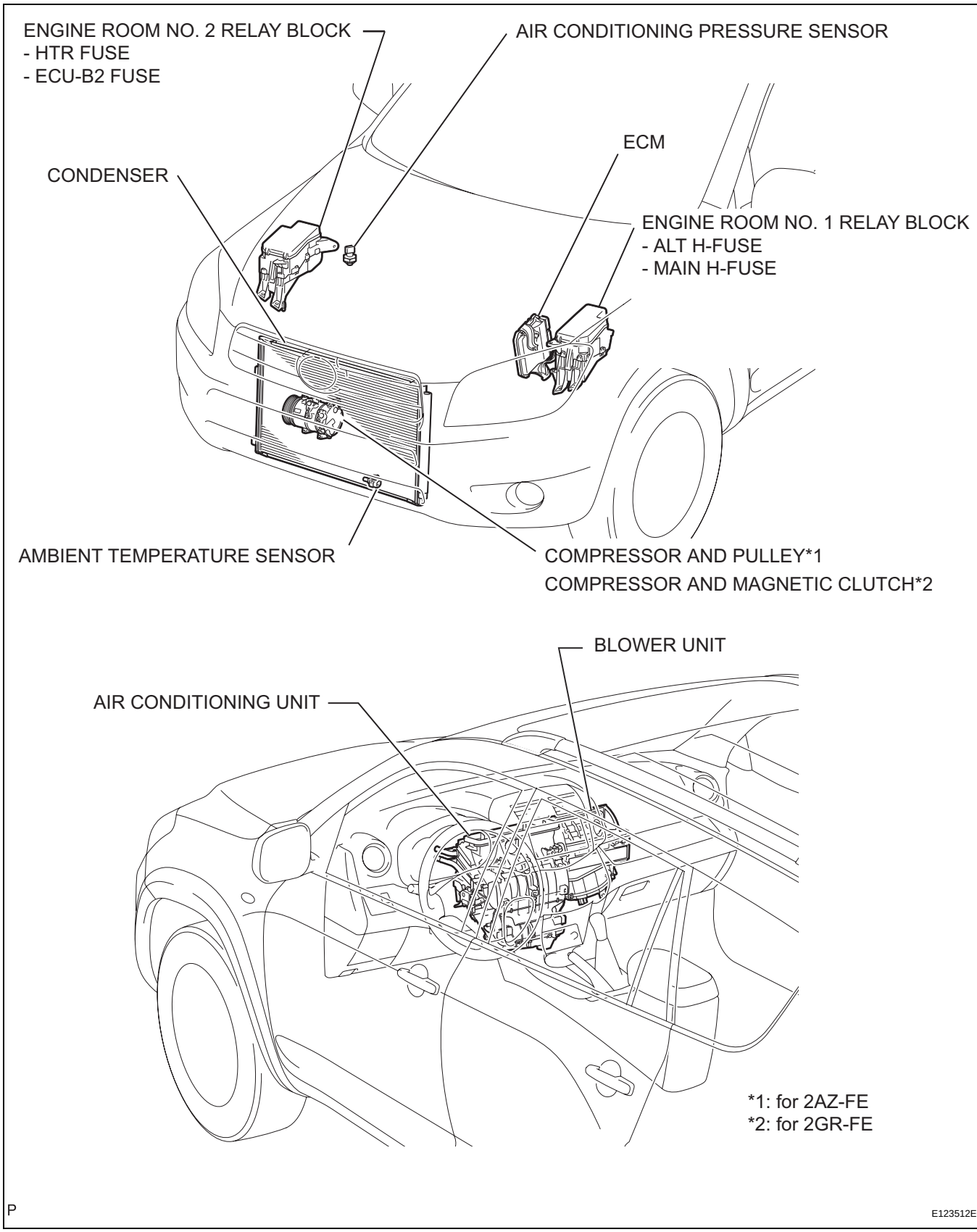
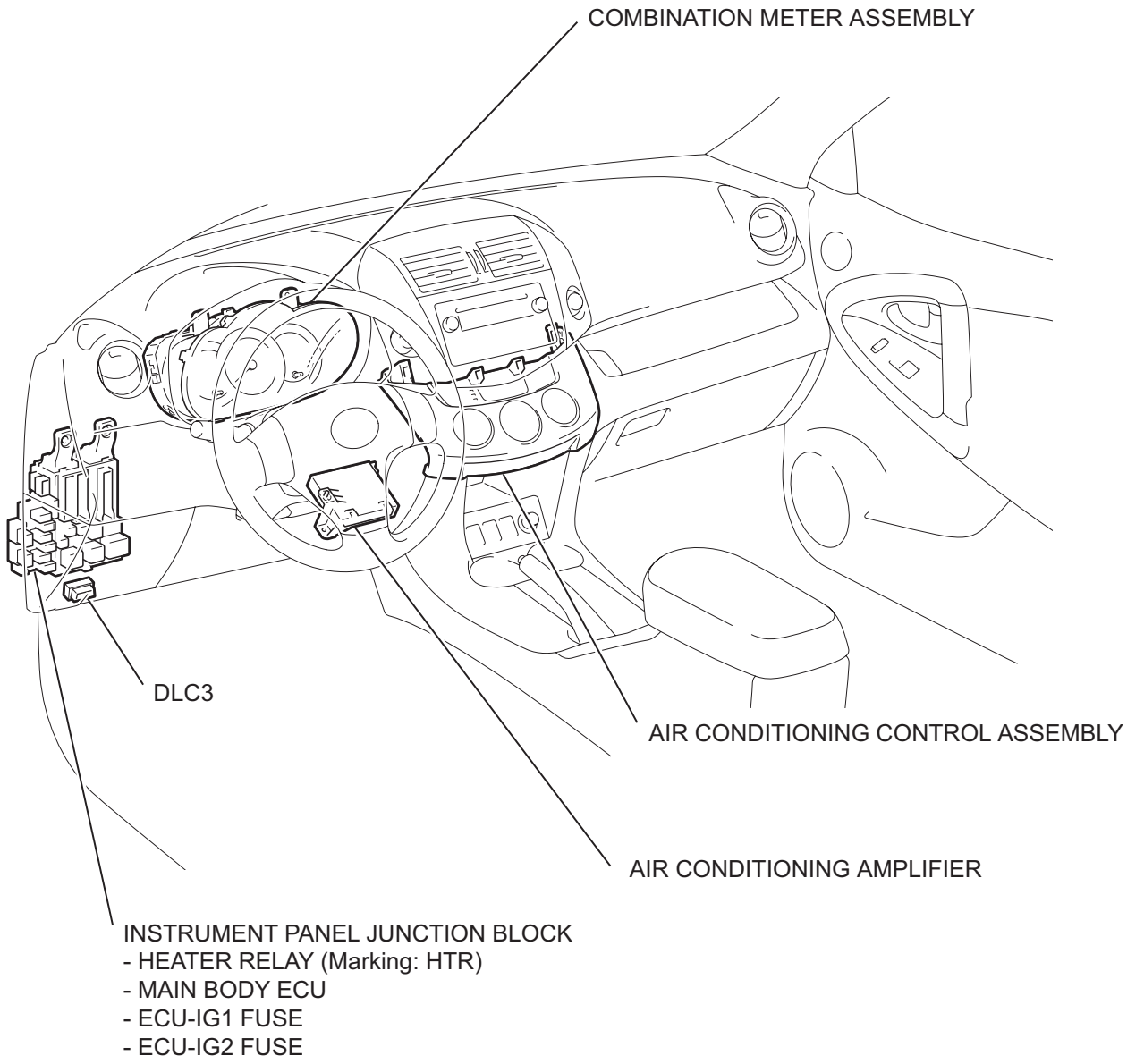
E125195E01

PARTS LOCATION

(2006/01-)



AC



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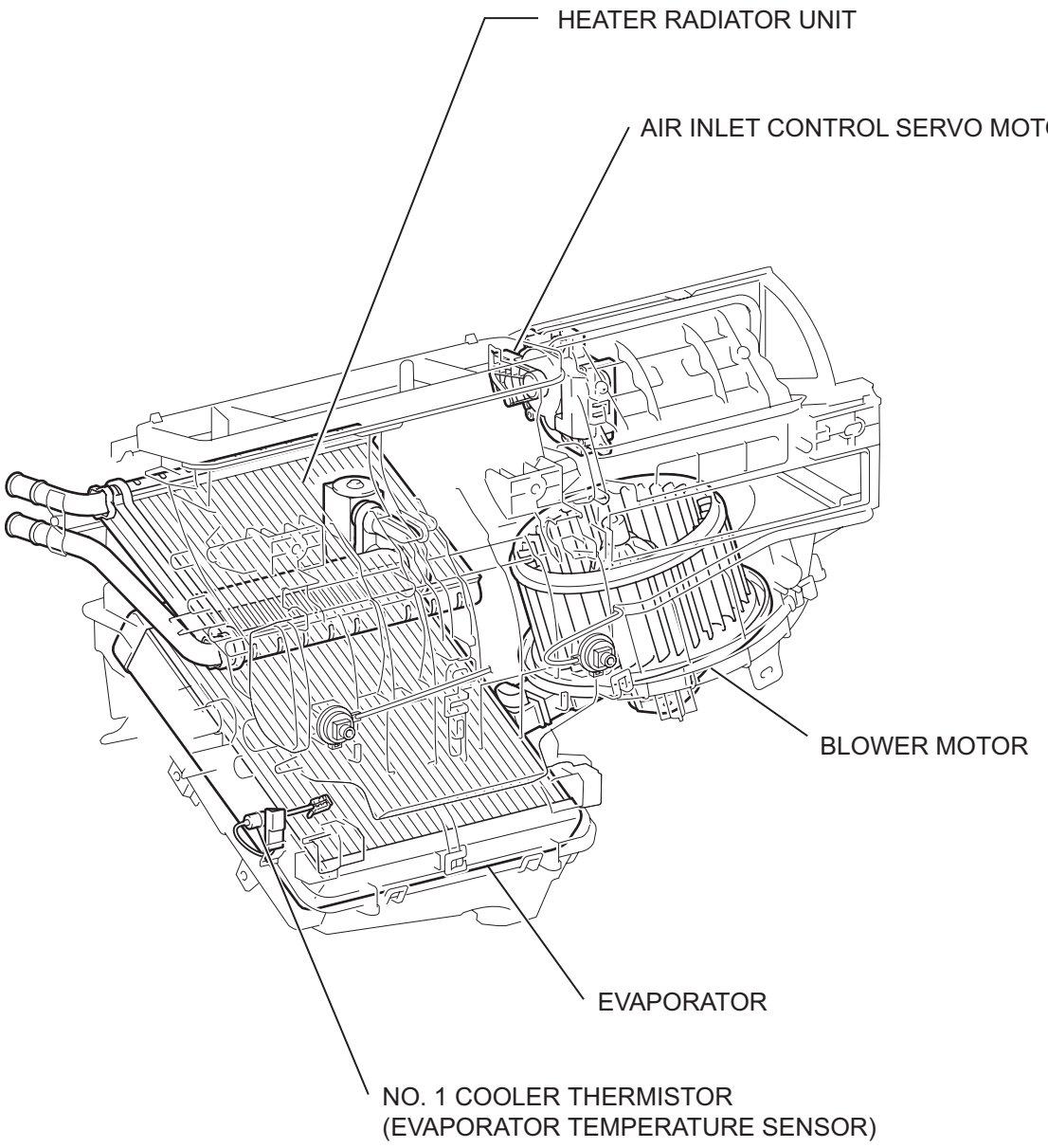

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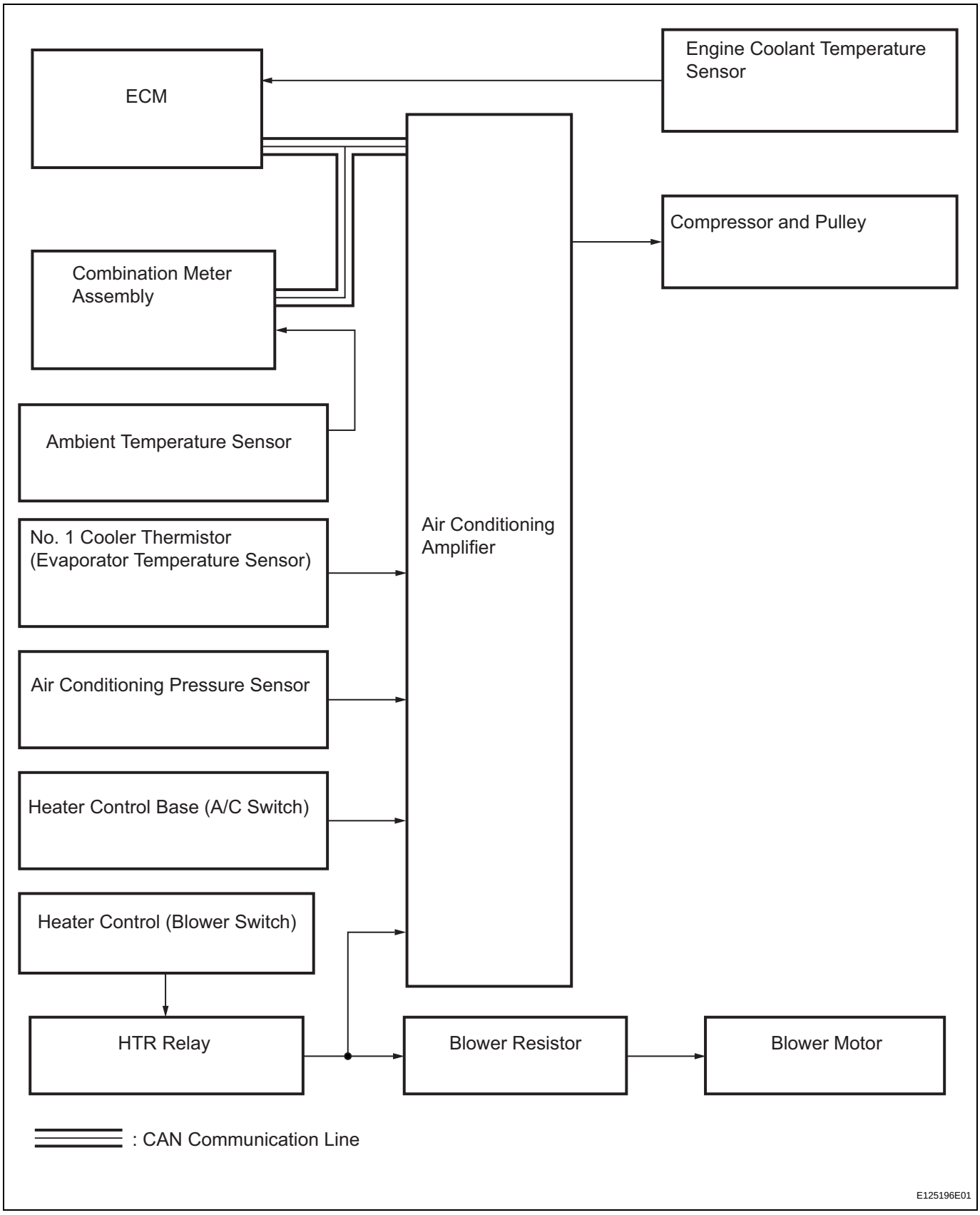
AC

SYSTEM DIAGRAM

(2005/11-2006/01)



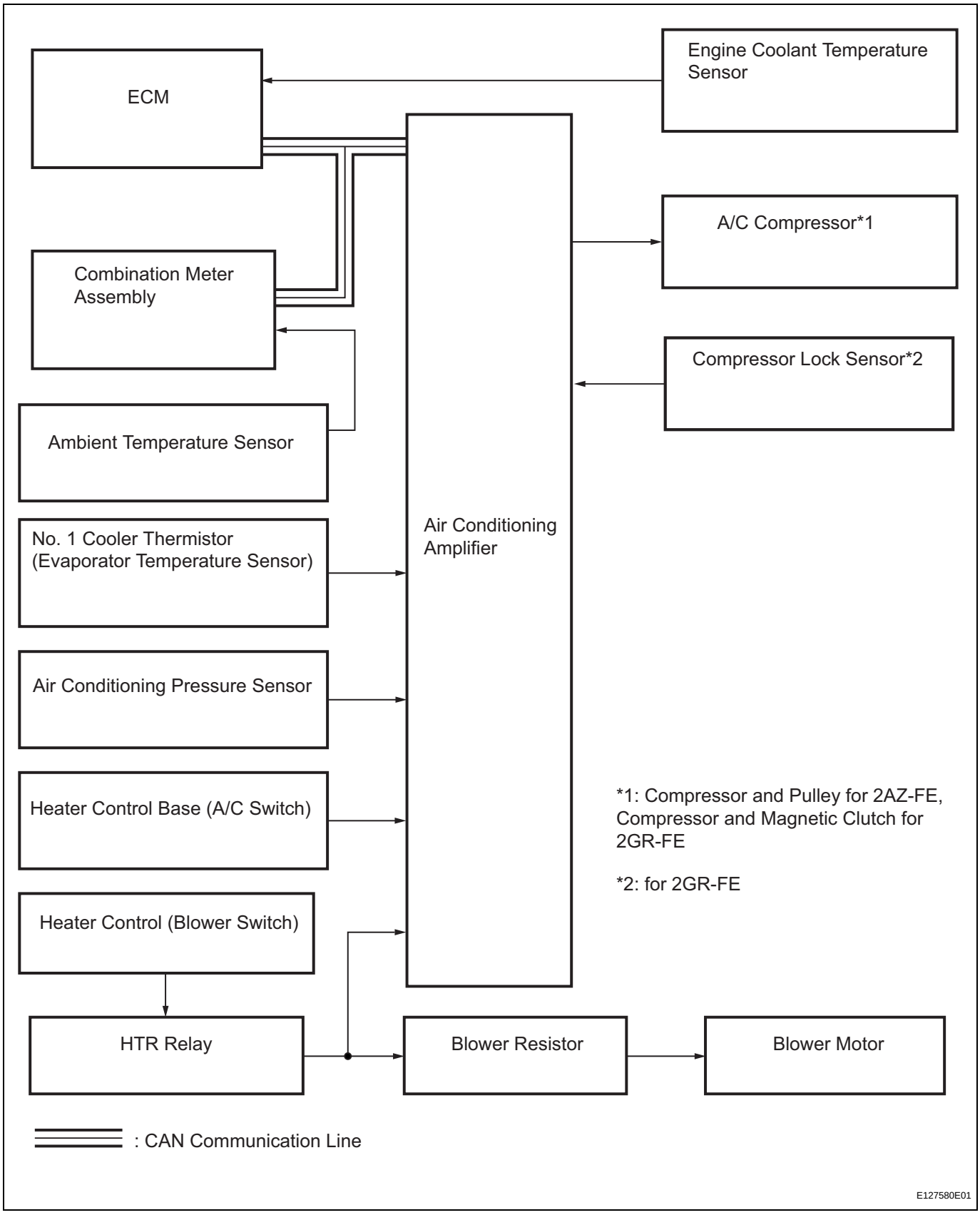
AC

Communication table

Sender	Receiver	Signal	Communication Line
Air conditioning amplifier	ECM	A/C compressor control signal	CAN
		Idle up request signal	
		External variable control solenoid current signal	
		Cooling fan motor driving request signal	
		Ambient temperature signal	
Combination meter assembly	Air conditioning amplifier	Vehicle speed signal	CAN
		Ambient temperature signal	
ECM	Air conditioning amplifier	Engine revolution speed signal	CAN
		Engine coolant temperature signal	
		A/C control cut signal	
		Variable control prohibition signal	

SYSTEM DIAGRAM

(2006/01-)



AC

Communication table

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		Idle up request signal	
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Combination meter assembly	Air conditioning amplifier	Vehicle speed signal	CAN
		Ambient temperature signal	
ECM	Air conditioning amplifier	Engine revolution speed signal	CAN
		Engine coolant temperature signal	
		A/C control cut signal	
		Variable control prohibition signal	

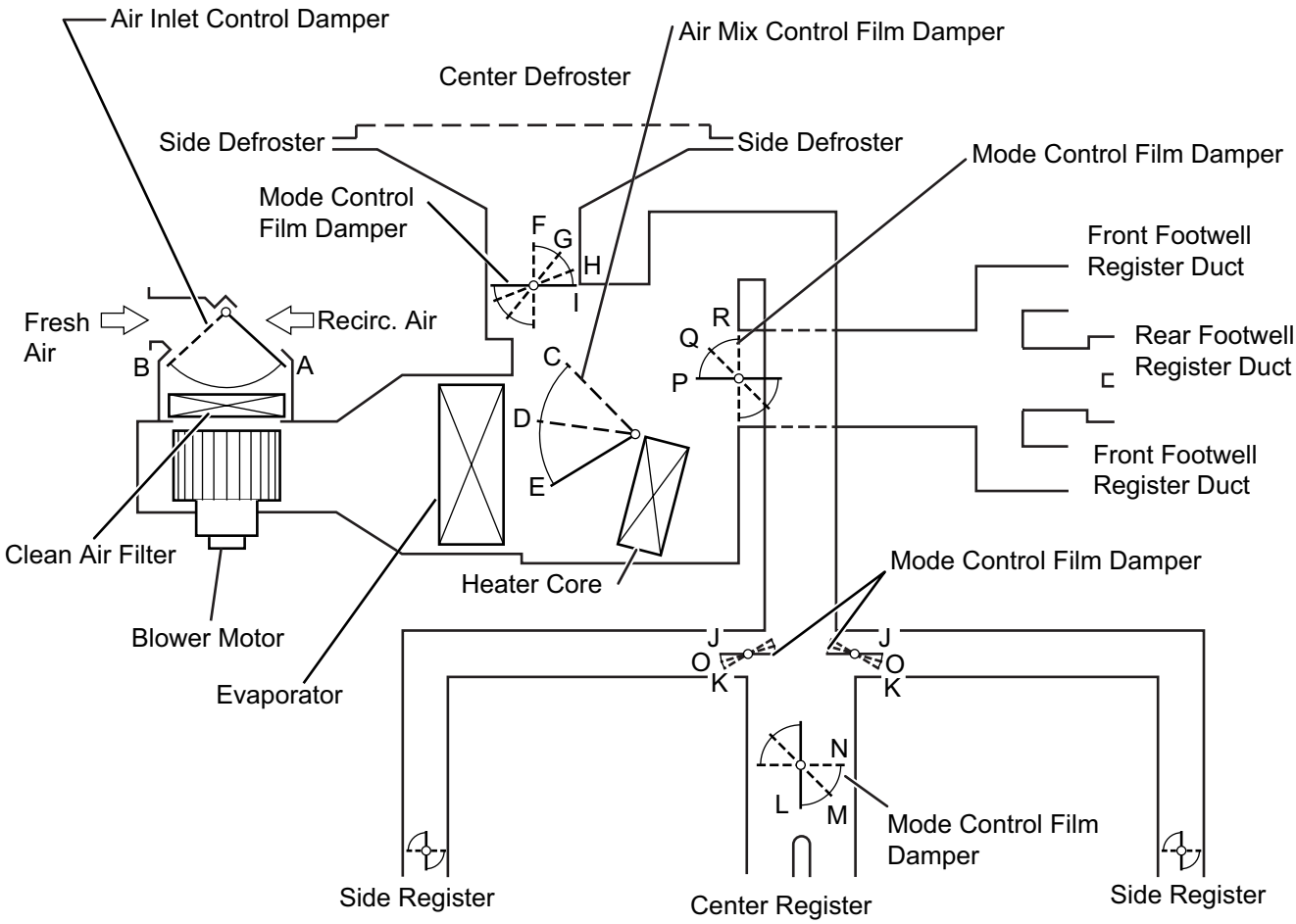
SYSTEM DESCRIPTION

1. GENERAL

(a) The air conditioning system has the following features:

- The air conditioning amplifier controls the operation of parts, such as the A/C compressor, automatically in accordance with the operating conditions of the air conditioning system.

2. MODE POSITION AND DAMPER OPERATION



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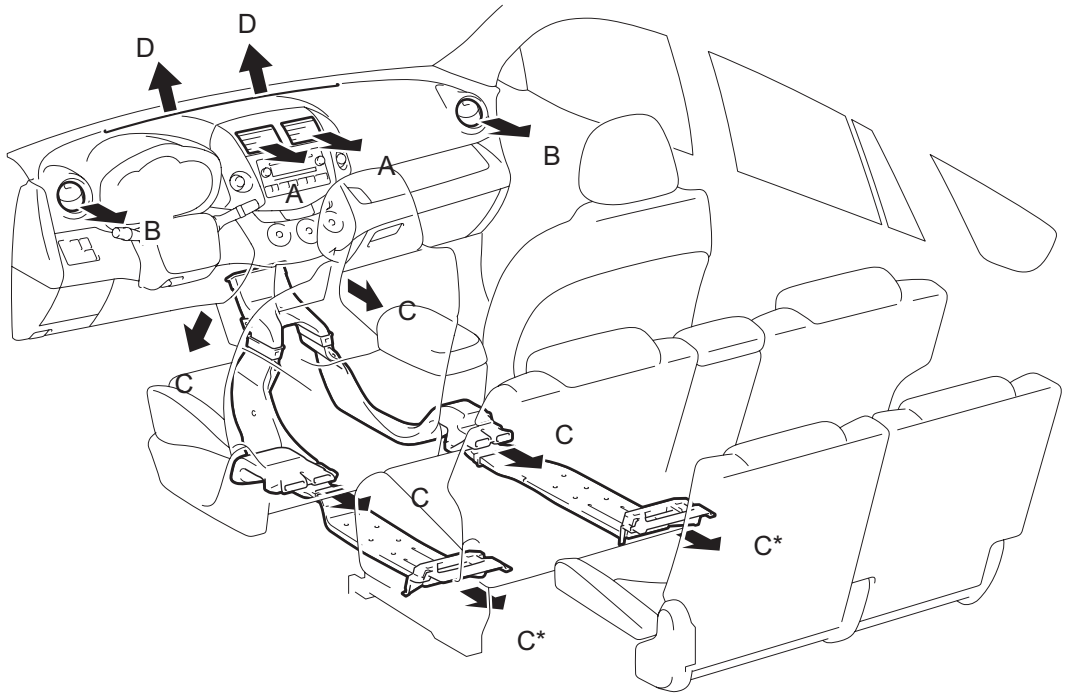
Control Damper	Control Position	Damper Position	Operation
Air Inlet Control Damper	FRESH	A	Brings in fresh air.
	RECIRC	B	Recirculates internal air.

Control Damper	Control Position	Damper Position	Operation
Air Mix Control Film Damper	COOL to HOT	C, D, E	Varies the mixture ratio of fresh air and the recirculation air in order to regulate the temperature continuously from HOT to COOL.
Mode Control Film Damper	FACE	I, J, L, R	Air blows out of center registers and side registers.
	BI-LEVEL	I, O, M, Q	Air mainly blows out of center registers, side registers, and footwell register ducts.
	FOOT	H, K, N, P	Air mainly blows out of front and rear footwell register ducts. In addition, air blows out slightly from front and side defrosters, and side registers.
	FOOT/DEF	G, K, N, Q	Air mainly blows out of front and side defrosters to defrost windshield. Air also blows out from front and rear footwell register ducts, and side registers.
	DEF	F, K, N, R	Air blows out of front and side defrosters and side registers to defrost windshield.

3. AIR OUTLET AND AIRFLOW VOLUME



*: w/ Rear No. 2 Seat

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The circle size (○) indicates the proportion of the flow volume.

Air Outlet Mode		Air Outlet Position Symbol			
		A	B	C	D
		Center Face	Side Face	Foot	Defroster
	FACE	◯	◯	X	X
	Bi-LEVEL	○	○	◯	X
	FOOT	X	○	◯	○
	FOOT/DEF	X	○	○	○
	DEF	X	○	X	◯

AC

HOW TO PROCEED WITH TROUBLESHOOTING

(2005/11-2006/01)

HINT:

- Use these procedures to troubleshoot the air conditioning system.
- *: Use the intelligent tester.

1 **VEHICLE BROUGHT TO WORKSHOP**

NEXT

2 **CUSTOMER PROBLEM ANALYSIS AND SYMPTOM CHECK**

NEXT

3 **INSPECT BATTERY VOLTAGE**

Standard voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

4 **CHECK CAN COMMUNICATION SYSTEM***

AC

(a) Use the intelligent tester to check if the CAN communication system is functioning.
Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → **Go to CAN COMMUNICATION SYSTEM**

A

5 **CHECK DTC***

(a) Check for DTCs and write down any DTCs that are output.
(b) Clear the DTCs.
(c) Recheck for DTCs. Based on the DTCs output above, try to cause output of the air conditioning system DTC by simulating the operation indicated by the DTC.

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B → **Go to step 8**

A

6	REFER TO PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B → **Go to step 8**

A

7	OVERALL ANALYSIS AND TROUBLESHOOTING*

(a) DATA LIST / ACTIVE TEST (see page AC-127)
(b) Terminals of ECU (see page AC-122)

NEXT

AC

8	ADJUST, REPAIR OR REPLACE

NEXT

9	CONFIRMATION TEST

NEXT

END

HOW TO PROCEED WITH TROUBLESHOOTING

(2006/01-)

HINT:

- Use these procedures to troubleshoot the air conditioning system.
- *: Use the intelligent tester.

1 **VEHICLE BROUGHT TO WORKSHOP**

NEXT

2 **CUSTOMER PROBLEM ANALYSIS AND SYMPTOM CHECK**

NEXT

3 **INSPECT BATTERY VOLTAGE**

Standard voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

4 **CHECK CAN COMMUNICATION SYSTEM***

AC

(a) Use the intelligent tester to check if the CAN communication system is functioning.
Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → **Go to CAN COMMUNICATION SYSTEM**

A

5 **CHECK DTC***

(a) Check for DTCs and write down any DTCs that are output.
(b) Clear the DTCs.
(c) Recheck for DTCs. Based on the DTCs output above, try to cause output of the air conditioning system DTC by simulating the operation indicated by the DTC.

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B → **Go to step 8**

A

6	REFER TO PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B → **Go to step 8**

A

7	OVERALL ANALYSIS AND TROUBLESHOOTING*

(a) DATA LIST / ACTIVE TEST (see page AC-128)
(b) Terminals of ECU (see page AC-123)

NEXT

AC

8	ADJUST, REPAIR OR REPLACE

NEXT

9	CONFIRMATION TEST

NEXT

END

PROBLEM SYMPTOMS TABLE

(2005/11-2006/01)

HINT:

- Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

Air conditioning system

Symptom	Suspected area	See page
No functions of A/C system operate	1. ECU-IG2 fuse	-
	2. Wire harness or connector	-
	3. Air conditioning amplifier	AC-122
Airflow Control: Blower motor does not operate	1. HTR, ECU-IG1 fuse	-
	2. Blower motor circuit	AC-157
	3. Blower motor	AC-207
	4. Wire harness or connector	-
Airflow Control: Blower motor does not change speed	1. Blower resistor	AC-208
	2. Blower motor	AC-207
	3. Heater control (blower switch)	-
Temperature Control: No cool air comes out	1. Refrigerant volume	-
	2. Refrigerant pressure	-
	3. Air conditioning pressure sensor circuit	AC-143
	4. Heater control base (A/C switch)	-
	5. Compressor and pulley	AC-215
	6. Expansion valve	-
	7. Air conditioning amplifier	AC-122
	8. ECM	ES-427
	9. CAN communication	CA-45
Compressor and pulley does not operate	1. ECU-IG2 fuse	-
	2. Refrigerant pressure	-
	3. Compressor and pulley	AC-215
	4. Air conditioning pressure sensor circuit	AC-143
	5. Evaporator temperature sensor circuit	AC-136
	6. Air conditioning amplifier	AC-122
	7. ECM	ES-427
	8. CAN communication	CA-45

PROBLEM SYMPTOMS TABLE

(2006/01-)

HINT:

- Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

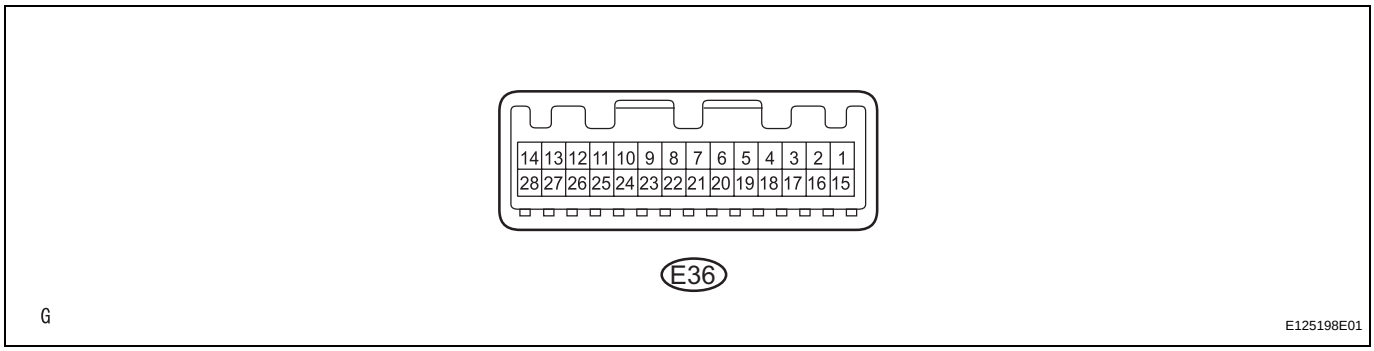
Air conditioning system

Symptom	Suspected area	See page
No functions of A/C system operate	1. ECU-IG2 fuse	-
	2. Wire harness or connector	-
	3. Air conditioning amplifier	AC-123
Airflow Control: Blower motor does not operate	1. HTR, ECU-IG1 fuse	-
	2. Blower motor circuit	AC-157
	3. Blower motor	AC-207
	4. Wire harness or connector	-
Airflow Control: Blower motor does not change speed	1. Blower resistor	AC-208
	2. Blower motor	AC-207
	3. Heater control (blower switch)	AC-239
Temperature Control: No cool air comes out	1. Refrigerant volume	-
	2. Refrigerant pressure	-
	3. Air conditioning pressure sensor circuit	AC-143
	4. Heater control base (A/C switch)	AC-242
	5. Compressor and pulley (for 2AZ-FE)	AC-215
	6. Compressor and magnetic clutch (for 2GR-FE)	AC-219
	7. Compressor circuit	AC-163
	8. Expansion valve	-
	9. Air conditioning amplifier	AC-123
	10. ECM (for 2AZ-FE)	ES-1
	11. ECM (for 2GR-FE)	ES-1
	12. CAN communication	CA-1
A/C compressor does not operate	1. ECU-IG2 fuse	-
	2. Refrigerant pressure	-
	3. Compressor and pulley (for 2AZ-FE)	AC-215
	4. Compressor and magnetic clutch (for 2GR-FE)	AC-219
	5. Air conditioning pressure sensor circuit	AC-143
	6. Evaporator temperature sensor circuit	AC-136
	7. Air conditioning amplifier	AC-123
	8. ECM (for 2AZ-FE)	ES-1
	9. ECM (for 2GR-FE)	ES-1
	10. CAN communication	CA-1
Engine idle up does not occur, or is continuos	1. Compressor circuit	AC-163
	2. ECM (for 2AZ-FE)	ES-1
	3. ECM (for 2GR-FE)	ES-1

TERMINALS OF ECU

(2005/11-2006/01)

1. CHECK AIR CONDITIONING AMPLIFIER

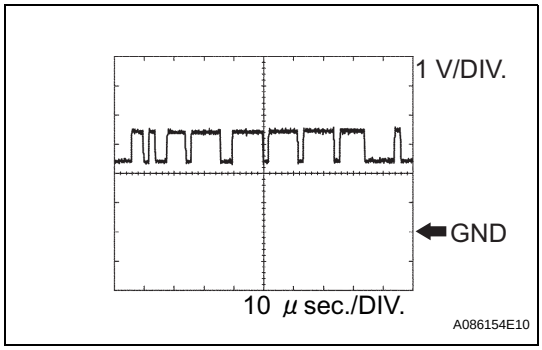


(a) Measure the voltage and resistance of the connectors.
HINT:
Check from the rear of the connector while it is connected to the air conditioning amplifier.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
S5-3 (E36-7) - GND (E36-24)	B - W-B	Power supply for pressure sensor	Ignition switch ON	4.5 to 5.5 V
CANH (E36-8) - GND (E36-24)	V - W-B	Hi-level CAN bus line	Ignition switch ON	Pulse generation (see waveform 1)
CANL (E36-9) - GND (E36-24)	W - W-B	Lo-level CAN bus line	Ignition switch ON	Pulse generation (see waveform 2)
SG-3 (E36-23) - Body ground	B - Body ground	Ground for evaporator temperature sensor	Always	Below 1 Ω
PRE (E36-12) - SG-2 (E36-10)	L - G	Air conditioning pressure sensor signal	Refrigerant pressure: normal	0.76 to 4.74 V
PRE (E36-12) - SG-2 (E36-10)	L - G	Air conditioning pressure sensor signal	Refrigerant pressure: Abnormal (less than 0.196 MPa [2.0 kgf/cm^2, 28 psi]	Below 0.76 V
PRE (E36-12) - SG-2 (E36-10)	L - G	Air conditioning pressure sensor signal	Refrigerant pressure: Abnormal (more than 3.14 MPa [32 kgf/cm^2, 455 psi])	4.74 V or more
SG-2 (E36-10) - Body ground	B - Body ground	Ground for pressure sensor	Always	Below 1 Ω
SOL+ (E36-13) - GND (E36-24)	GR - W-B	A/C compressor operation signal	Engine idling	Pulse generation (see waveform 3)
			Heater control (blower switch): 1	
			A/C switch ON	
IG+ (E36-14) - GND (E36-24)	Y - W-B	Power source (IG)	Ignition switch ON	10 to 14 V
SBLW (E36-21) - GND (E36-24)	GR - W-B	Blower motor ON signal	Ignition switch ON	10 to 14 V → Below 1 V
			Heater control (blower switch): 0 → 1	
TE (E36-22) - SG-3 (E36-23)	W - B	Evaporator temperature sensor signal	Ignition switch ON	1 to 1.3 V
			Temperature near evaporator: 15°C (59°F)	
GND (E36-24) - Body ground	W-B - Body ground	Ground for main power supply	Always	Below 1 Ω
A/C (E36-27) - GND (E36-24)	P - W-B	A/C switch signal	Ignition switch ON	Below 1 V → 10 to 14 V
			A/C switch OFF → ON	

AC

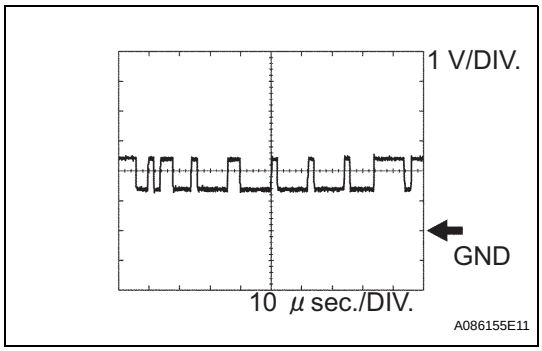
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
LED (E36-28) - Body ground	GR - Body ground	A/C switch indicator signal	Engine idling	10 to 14 V → Below 4 V
			A/C switch ON	
			Heater control (blower switch): 0 → 1	



(b) Using an oscilloscope, check waveform 1.
CAN communication signal

Item	Content
Symbols (Terminal No.)	CANH (E36-8) - GND (E36-24)
Tool Setting	1 V/DIV., 10 μsec./DIV.
Condition	Ignition switch ON

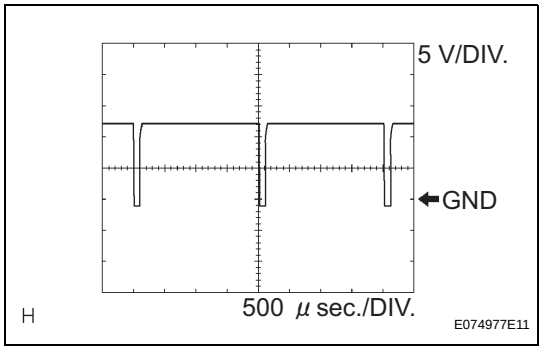
HINT:
The waveform varies depending on the CAN communication signal.



(c) Using an oscilloscope, check waveform 2.
CAN communication signal

Item	Content
Symbols (Terminal No.)	CANL (E36-9) - GND (E36-24)
Tool Setting	1 V/DIV., 10 μmsec./DIV.
Condition	Ignition switch ON

HINT:
The waveform varies depending on the CAN communication signal.



(d) Using an oscilloscope, check waveform 3.
Compressor and pulley operation signal

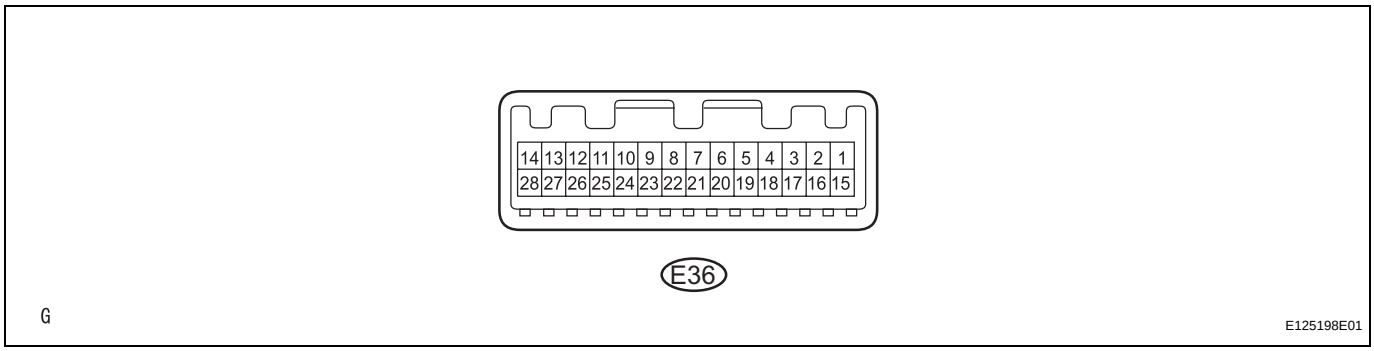
Item	Content
Symbols (Terminal No.)	SOL+ (E36-13) - GND (E36-24)
Tool Setting	5 V/DIV., 500 μsec./DIV.
Condition	Engine idling, Blower switch LO, A/C switch ON

AC

TERMINALS OF ECU

(2006/01-)

1. CHECK AIR CONDITIONING AMPLIFIER



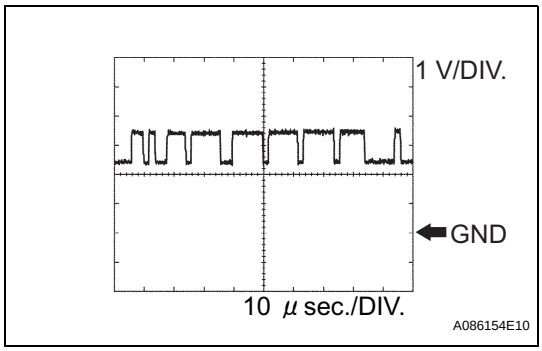
(a) Measure the voltage and resistance of the connectors.
HINT:
Check from the rear of the connector while it is connected to the air conditioning amplifier.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
S5-3 (E36-7) - GND (E36-24)	B - W-B	Power supply for pressure sensor	Ignition switch ON	4.5 to 5.5 V
CANH (E36-8) - GND (E36-24)	V - W-B	Hi-level CAN bus line	Ignition switch ON	Pulse generation (see waveform 1)
CANL (E36-9) - GND (E36-24)	W - W-B	Lo-level CAN bus line	Ignition switch ON	Pulse generation (see waveform 2)
SG-3 (E36-23) - Body ground	B - Body ground	Ground for evaporator temperature sensor	Always	Below 1 Ω
PRE (E36-12) - SG-2 (E36-10)	L - G	Air conditioning pressure sensor signal	Refrigerant pressure: normal	0.76 to 4.74 V
PRE (E36-12) - SG-2 (E36-10)	L - G	Air conditioning pressure sensor signal	Refrigerant pressure: Abnormal (less than 0.196 MPa [2.0 kgf/cm^2, 28 psi]	Below 0.76 V
PRE (E36-12) - SG-2 (E36-10)	L - G	Air conditioning pressure sensor signal	Refrigerant pressure: Abnormal (more than 3.14 MPa [32 kgf/cm^2, 455 psi])	4.74 V or more
SG-2 (E36-10) - Body ground	B - Body ground	Ground for pressure sensor	Always	Below 1 Ω
SOL+ (E36-13) - GND (E36-24)	GR - W-B	A/C compressor operation signal	Engine idling	Pulse generation (see waveform 3)
			Heater control (blower switch): 1	
			A/C switch ON	
IG+ (E36-14) - GND (E36-24)	Y - W-B	Power source (IG)	Ignition switch ON	10 to 14 V
SBLW (E36-21) - GND (E36-24)	GR - W-B	Blower motor ON signal	Ignition switch ON	10 to 14 V → Below 1 V
			Heater control (blower switch): 0 → 1	
TE (E36-22) - SG-3 (E36-23)	W - B	Evaporator temperature sensor signal	Ignition switch ON	1 to 1.3 V
			Temperature near evaporator: 15°C (59°F)	
GND (E36-24) - Body ground	W-B - Body ground	Ground for main power supply	Always	Below 1 Ω
A/C (E36-27) - GND (E36-24)	P - W-B	A/C switch signal	Ignition switch ON	Below 1 V → 10 to 14 V
			A/C switch OFF → ON	

AC

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
LED (E36-28) - Body ground	GR - Body ground	A/C switch indicator signal	Engine idling	10 to 14 V → Below 4 V
			A/C switch ON	
			Heater control (blower switch): 0 → 1	
LOCK (E36-3)* - SG-2 (E36-10)	W - G	Compressor lock sensor signal	Ignition switch ON A/C switch ON Magnetic clutch ON	Pulse generation (see waveform 4)
MGC (E36-15)* - GND (E36-24)	V - W-B	Magnetic clutch relay signal	Ignition switch ON Magnetic clutch OFF	10 to 14 V
MGC (E36-15)* - GND (E36-24)	W - B	Magnetic clutch relay signal	Ignition switch ON Magnetic clutch ON	Below 1 V

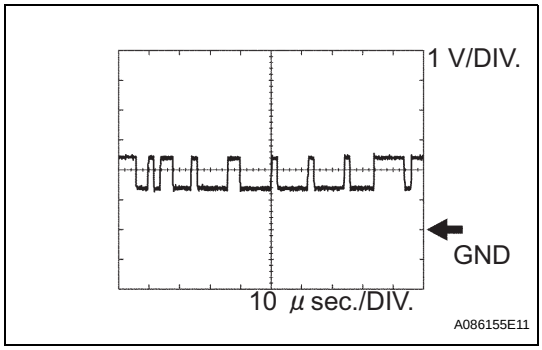
HINT:
*: for 2GR-FE



(b) Using an oscilloscope, check waveform 1.
CAN communication signal

Item	Content
Symbols (Terminal No.)	CANH (E36-8) - GND (E36-24)
Tool Setting	1 V/DIV., 10 μsec./DIV.
Condition	Ignition switch ON

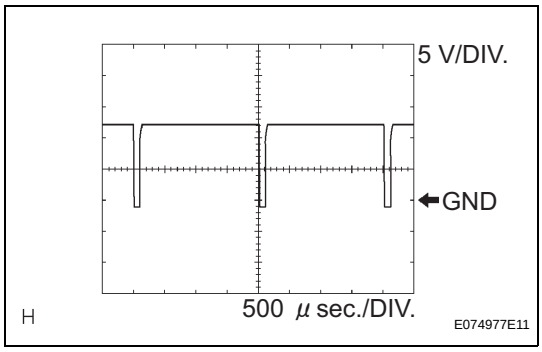
HINT:
The waveform varies depending on the CAN communication signal.



(c) Using an oscilloscope, check waveform 2.
CAN communication signal

Item	Content
Symbols (Terminal No.)	CANL (E36-9) - GND (E36-24)
Tool Setting	1 V/DIV., 10 μmsec./DIV.
Condition	Ignition switch ON

HINT:
The waveform varies depending on the CAN communication signal.

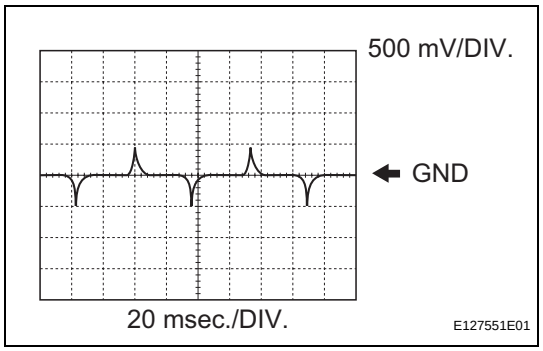


(d) Using an oscilloscope, check waveform 3.
A/C Compressor* operation signal

Item	Content
Symbols (Terminal No.)	SOL+ (E36-13) - GND (E36-24)
Tool Setting	5 V/DIV., 500 μsec./DIV.
Condition	Engine idling, Blower switch LO, A/C switch ON

HINT:
*: Compressor and pulley for 2AZ-FE, compressor and magnetic clutch for 2GR-FE

AC



(e) Using an oscilloscope, check waveform 4.
Compressor lock sensor signal*

Item	Content
Symbols (Terminal No.)	LOCK (E36-3)* - SG-2 (E36-10)
Tool Setting	500 mV/DIV., 20 msec./DIV.
Condition	Ignition switch ON, A/C switch ON, Magnetic clutch ON

HINT:
*: for 2GR-FE

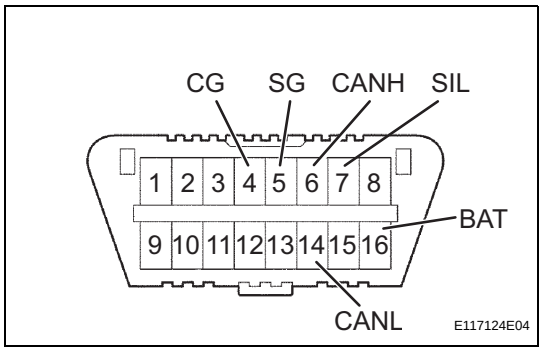
AC

DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) Air conditioning system data and the Diagnostic Trouble Codes (DTCs) can be read through the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the intelligent tester to check for malfunctions and perform troubleshooting.

2. CHECK DLC3



The vehicle's ECM uses the ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG(5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	HIGH-level CAN bus line	Ignition switch LOCK*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch LOCK*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch LOCK*	1 MΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch LOCK*	200 Ω or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Ignition switch LOCK*	1 MΩ or higher

AC

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

NOTICE:

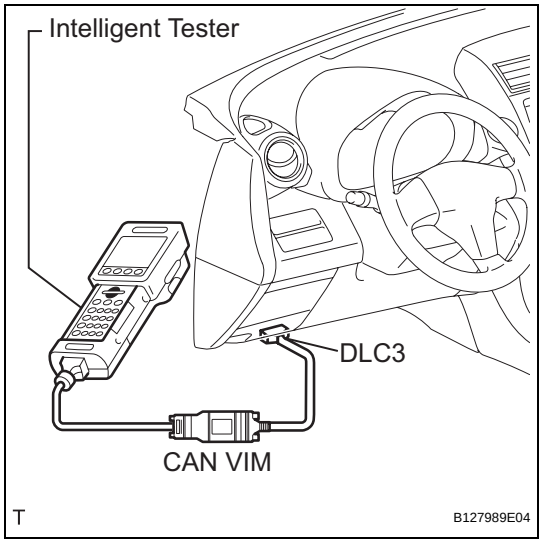
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, other switches or doors.**

HINT:

Connect the cable of the intelligent tester (with CAN VIM) to the DLC3, turn the ignition switch ON and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.

If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.



DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch ON and turn the intelligent tester ON.

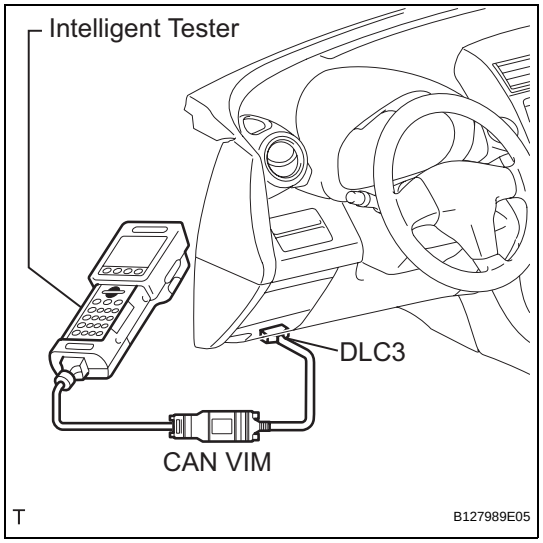
(c) Read the DTC by following the prompts on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch ON and turn the intelligent tester ON.

(c) Clear the DTC by following the prompts on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.



DATA LIST / ACTIVE TEST

(2005/11-2006/01)

1. READ DATA LIST

HINT:
Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch ON and turn the intelligent tester ON.

(c) Read the DATA LIST by following the prompts on the tester.

AC

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
AMBI TEMP SENS	Ambient temperature sensor / Min.: -23.3°C (-9.94°F) Max.: 65.95°C (150.71°F)	Actual ambient temperature is displayed	Open circuit: -23.3°C (-9.94°F) Short circuit: 65.95°C (150.71°F)
COOLANT TEMP	Engine coolant temperature / Min.: 1.3°C (34.34°F) Max.: 90.55°C (194.99°F)	Actual engine coolant temperature is displayed after engine warmed up	-
AMBI TEMP	Adjusted ambient temperature / Min.: -30.8°C (-23.44°F) Max.: 50.8°C (123.44°F)	-	-
EVAP FIN TEMP	Evaporator temperature sensor / Min.: -29.7°C (-21.46°F) Max.: 59.6°C (139.28°F)	Actual evaporator temperature is displayed	Open circuit: -29.7°C (-21.46°F) Short circuit: 59.6°C (139.28°F)
REG PRESS SENS	Regulator pressure sensor / Min.: 0 MPaG Max.: 3.187 MPaG	Actual regulator pressure is displayed	-

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
REG CTRL CURRNT	Regulator control current / Min.: 0 A Max.: 0.997 A	Value changes between 0 A and 0.997 A in accordance with compressor and magnetic clutch operation	-
DESTINATION	Destination / DOMEST, USA, EUROPE, AUSTRAL, MIDEAST, NO INFO	Destinations displayed	-
#CODES	Number of trouble codes / Min.: 0, Max.: 255	Number of DTCs displayed	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed in the ACTIVE TEST.

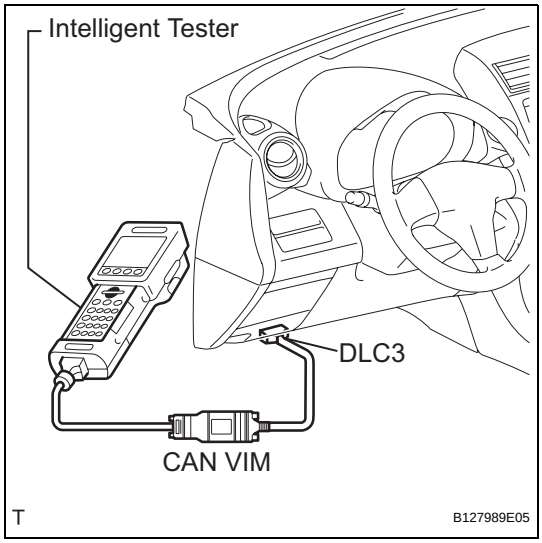
(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch ON and turn the intelligent tester ON.

(c) Perform the ACTIVE TEST by following the prompts on the tester.

Air conditioning amplifier

Item	Test Details / Display (Range)	Diagnostic Note
A/C COMPRESSOR	A/C compressor / OFF, ON	-



DATA LIST / ACTIVE TEST

(2006/01-)

1. READ DATA LIST

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch ON and turn the intelligent tester ON.

(c) Read the DATA LIST by following the prompts on the tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
AMBI TEMP SENS	Ambient temperature sensor / Min.: -23.3°C (-9.94°F) Max.: 65.95°C (150.71°F)	Actual ambient temperature is displayed	Open circuit: -23.3°C (-9.94°F) Short circuit: 65.95°C (150.71°F)
COOLANT TEMP	Engine coolant temperature / Min.: 1.3°C (34.34°F) Max.: 90.55°C (194.99°F)	Actual engine coolant temperature is displayed after engine warmed up	-
AMBI TEMP	Adjusted ambient temperature / Min.: -30.8°C (-23.44°F) Max.: 50.8°C (123.44°F)	-	-

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
EVAP FIN TEMP	Evaporator temperature sensor / Min.: -29.7°C (-21.46°F) Max.: 59.6°C (139.28°F)	Actual evaporator temperature is displayed	Open circuit: -29.7°C (-21.46°F) Short circuit: 59.6°C (139.28°F)
REG PRESS SENS	Regulator pressure sensor / Min.: 0 MPaG Max.: 3.187 MPaG	Actual regulator pressure is displayed	-
REG CTRL CURRNT	Regulator control current / Min.: 0 A Max.: 0.997 A	Value changes between 0 A and 0.997 A in accordance with compressor and magnetic clutch operation	-
DESTINATION	Destination / DOMEST, USA, EUROPE, AUSTRAL, MIDEAST, NO INFO	Destinations displayed	-
#CODES	Number of trouble codes / Min.: 0, Max.: 255	Number of DTCs displayed	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed in the ACTIVE TEST.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch ON and turn the intelligent tester ON.

(c) Perform the ACTIVE TEST by following the prompts on the tester.

Air conditioning amplifier

Item	Test Details / Display (Range)	Diagnostic Note
A/C COMPRESSOR*1	A/C Compressor OFF, ON	-
A/C MAG CLUTCH*2	Magnetic clutch relay / OFF, ON	Operating sound can be heard

HINT:

*1: for 2AZ-FE

*2: for 2GR-FE

DIAGNOSTIC TROUBLE CODE CHART

(2005/11-2006/01)
HINT:
When the air conditioning system functions properly, DTC B1400/00 is output.

Air conditioning system

DTC No.	Detection Item	Trouble Area	Memory	See page
B1412/12	Ambient Temperature Sensor Circuit	- Ambient temperature sensor - Harness and connector between ambient temperature sensor and combination meter assembly - Combination meter assembly - Air conditioning amplifier - CAN communication line	Memorized (8.5 min. or more)	AC-132
B1413/13	Evaporator Temperature Sensor Circuit	- No. 1 cooler thermistor (Evaporator temperature sensor) - Harness and connector between No. 1 cooler thermistor (evaporator temperature sensor) and air conditioning amplifier - Air conditioning amplifier	Memorized (8.5 min. or more)	AC-136
B1423/23	Pressure Sensor Circuit	- Air conditioning pressure sensor - Harness and connector between air conditioning pressure sensor and air conditioning amplifier - Air conditioning amplifier	-	AC-143
B1451/51	Compressor Solenoid Circuit	- Compressor and pulley - Harness and connector between air conditioning amplifier and compressor and pulley - Air conditioning amplifier	-	AC-148
B1499/99	Multiplex Communication Circuit	- Air conditioning amplifier - Power source circuit - Air conditioning amplifier - ECM - Combination meter assembly - CAN communication line	-	AC-156

DIAGNOSTIC TROUBLE CODE CHART

(2006/01-)

HINT:

When the air conditioning system functions properly, DTC B1400/00 is output.

Air Conditioning system

DTC No.	Detection Item	Trouble Area	Memory	See page
B1412/12	Ambient Temperature Sensor Circuit	- Ambient temperature sensor - Wire harness between ambient temperature sensor and combination meter assembly - Combination meter assembly - Air conditioning amplifier - CAN communication line	Memorized (8.5 min. or more)	AC-132
B1413/13	Evaporator Temperature Sensor Circuit	- No. 1 cooler thermistor (Evaporator temperature sensor) - Wire harness between No. 1 cooler thermistor (evaporator temperature sensor) and air conditioning amplifier - Air conditioning amplifier	Memorized (8.5 min. or more)	AC-136
B1422/22*1	Compressor Lock Sensor Circuit	- Compressor and magnetic clutch - Compressor and magnetic clutch drive belt - Compressor lock sensor - Wire harness between compressor lock sensor and air conditioning amplifier - Air conditioning amplifier	-	AC-140
B1423/23	Pressure Sensor Circuit	- Air conditioning pressure sensor - Harness and connector between air conditioning pressure sensor and air conditioning amplifier - Air conditioning amplifier	-	AC-143
B1451/51	Compressor Solenoid Circuit	- A/C Compressor*2 - Wire harness between air conditioning amplifier and A/C compressor*2 - Air conditioning amplifier	-	AC-152
B1499/99	Multiplex Communication Circuit	- Air conditioning amplifier - ECM - Combination meter assembly - CAN communication line	-	AC-156

HINT:

*1: DTC B1422/22 (Compressor Lock Sensor Circuit) is indicated only for a currently occurring malfunction for 2GR-FE.

*2: Compressor and Pulley for 2AZ-FE, Compressor and Magnetic Clutch for 2GR-FE

DTC	B1412/12	Ambient Temperature Sensor Circuit

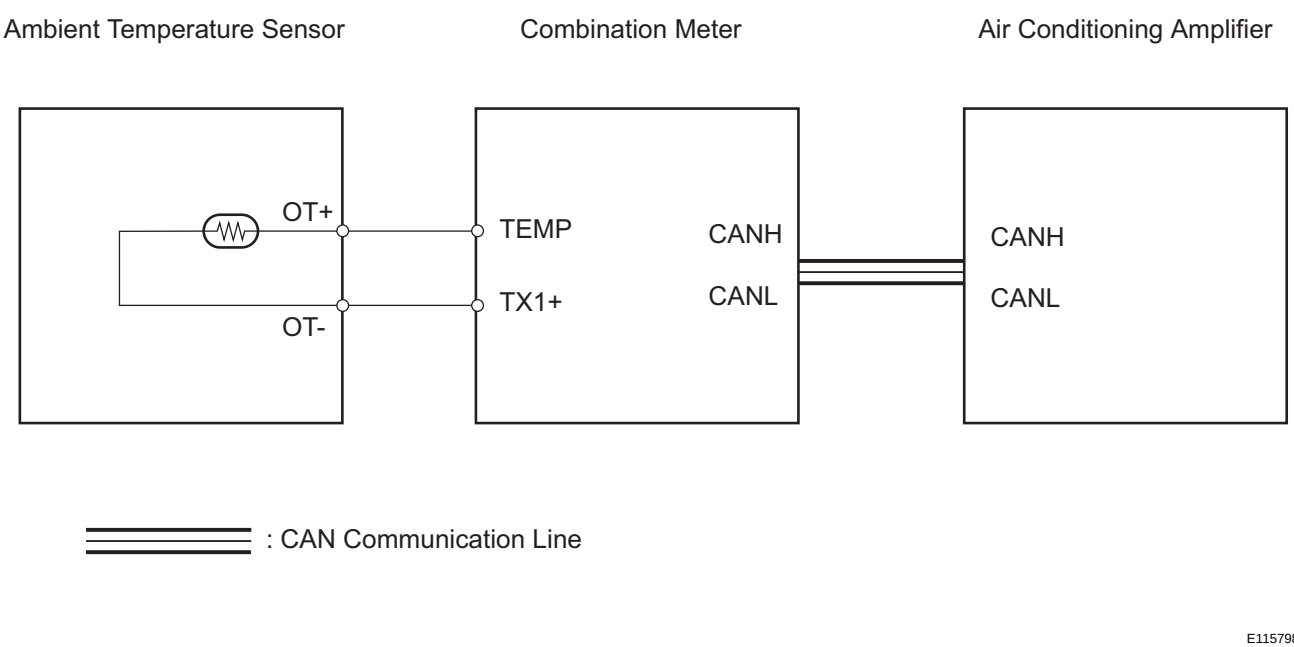
DESCRIPTION

The ambient temperature sensor is installed in the front part of the condenser to detect the ambient temperature and control the air conditioner. The sensor is connected to the combination meter and detects fluctuations in the ambient temperature. This data is used for controlling the room temperature. The sensor sends a signal to the air conditioning amplifier via the combination meter. The resistance of the ambient temperature sensor changes in accordance with the ambient temperature. As the temperature decreases, the resistance increases. As the temperature increases, the resistance decreases.

The air conditioning amplifier applies a voltage (5 V) to the ambient temperature sensor and reads voltage changes as changes in the resistance of the ambient temperature sensor. The combination meter sends the read signal to the air conditioning amplifier via CAN communication.

DTC No.	DTC Detection Condition	Trouble Area
B1412/12	Open or short in ambient temperature sensor circuit	• Ambient temperature sensor • Harness and connector between ambient temperature sensor and combination meter • Combination meter • Air conditioning amplifier • CAN communication line

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER (AMBI TEMP SENS)

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch ON and turn the intelligent tester main switch ON.
(c) Select the item below in the DATA LIST, and read the value displayed on the intelligent tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
AMBI TEMP SENS	Ambient temperature sensor / Min.: -23.3°C (-9.94°F) Max.: 65.95°C (150.71°F)	Actual ambient temperature is displayed	Open circuit: -23.3°C (-9.94°F) Short circuit: 65.95°C (150.71°F)

OK:

The display is as specified in the normal condition column.

Result

Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

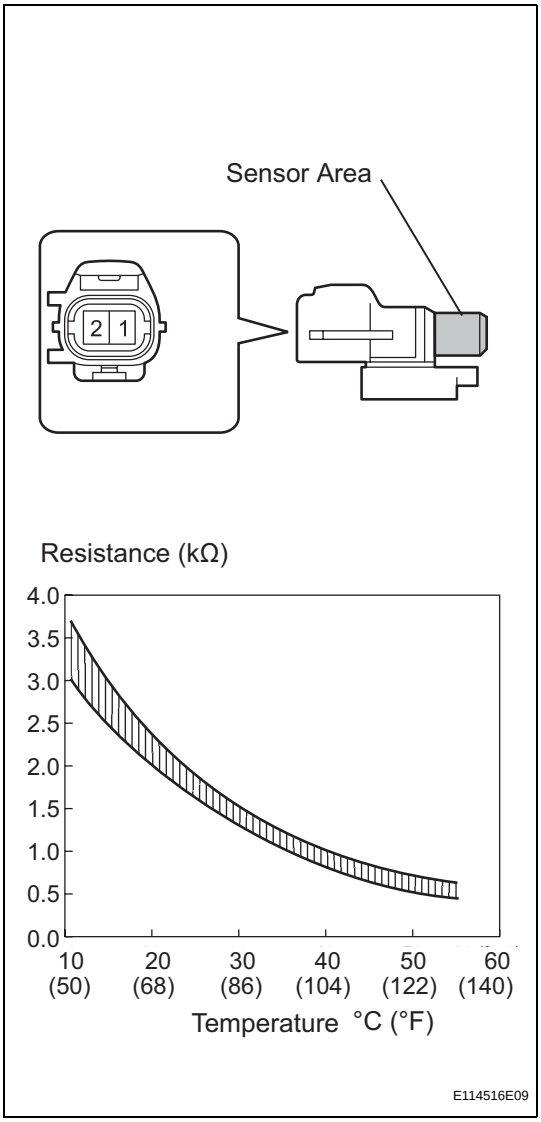
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

AC

2	INSPECT AMBIENT TEMPERATURE SENSOR



(a) Remove the ambient temperature sensor.
(b) Measure the resistance of the sensor.
Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	10°C (50°F)	3.00 to 3.73 kΩ
1 - 2	15°C (50°F)	2.45 to 2.88 kΩ
1 - 2	20°C (68°F)	1.95 to 2.30 kΩ
1 - 2	25°C (77°F)	1.60 to 1.80 kΩ
1 - 2	30°C (86°F)	1.28 to 1.47 kΩ
1 - 2	35°C (95°F)	1.00 to 1.22 kΩ
1 - 2	40°C (104°F)	0.80 to 1.00 kΩ
1 - 2	45°C (113°F)	0.65 to 0.85 kΩ
1 - 2	50°C (122°F)	0.50 to 0.70 kΩ
1 - 2	55°C (131°F)	0.44 to 0.60 kΩ
1 - 2	60°C (140°F)	0.36 to 0.50 kΩ

NOTICE:
- **Touching the sensor even slightly may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

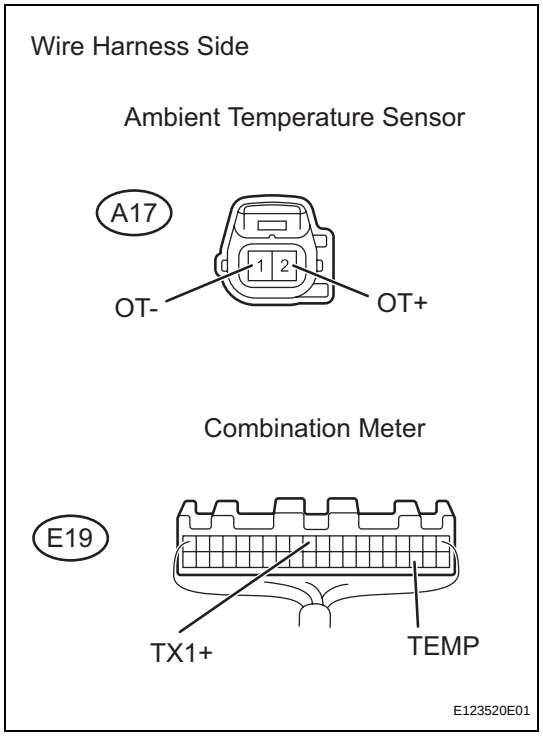
HINT:
As the temperature increases, the resistance decreases (see the graph).

NG → **REPLACE AMBIENT TEMPERATURE SENSOR**

OK

AC

3	CHECK WIRE HARNESS (AMBIENT TEMPERATURE SENSOR - COMBINATION METER)



(a) Disconnect the A17 sensor connector.
(b) Disconnect the E19 meter connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
A17-2 (OT+) - E19-23 (TEMP)	Below 1 Ω
A17-1 (OT-) - E19-11 (TX1+)	Below 1 Ω
A17-2 (OT+) - Body ground	1 MΩ or higher
A17-1 (OT-) - Body ground	1 MΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE COMBINATION METER

AC

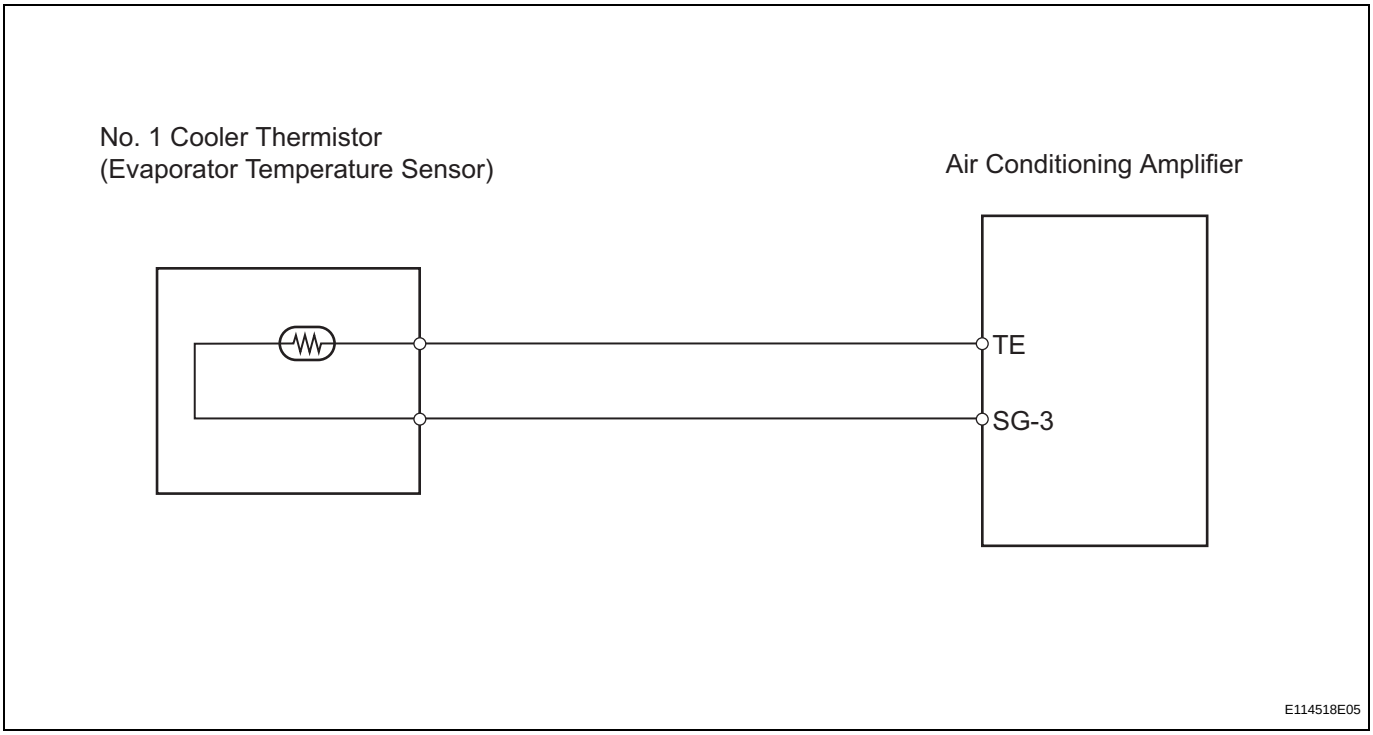
DTC	B1413/13	Evaporator Temperature Sensor Circuit

DESCRIPTION

The No. 1 cooler thermistor (evaporator temperature sensor) is installed on the evaporator in the air conditioning unit to detect the temperature of the cooled air that has passed through the evaporator and to control the air conditioner. It sends signals to the air conditioning amplifier. The signals change in accordance with the resistance of the No. 1 cooler thermistor (evaporator temperature sensor). As the temperature decreases, the resistance increases. As the temperature increases, the resistance decreases. The air conditioning amplifier applies a voltage (5 V) to the No. 1 cooler thermistor (evaporator temperature sensor) and reads voltage changes as changes in the resistance of the No. 1 cooler thermistor (evaporator temperature sensor). This sensor is used for frost prevention.

DTC No.	DTC Detection Condition	Trouble Area
B1413/13	Open or short in evaporator temperature sensor circuit	• No. 1 cooler thermistor (evaporator temperature sensor) • Harness and connector between No. 1 cooler thermistor (evaporator temperature sensor) and air conditioning amplifier • Air conditioning amplifier

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER (EVAP FIN TEMP)

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch ON and turn the intelligent tester main switch ON.
(c) Select the item below in the DATA LIST, and read the value displayed on the intelligent tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
EVAP FIN TEMP	Evaporator temperature sensor / Min.: -29.7°C (-21.46°F) Max.: 59.6°C (139.28°F)	Actual evaporator temperature is displayed	Open circuit: -29.7°C (-21.46°F) Short circuit: 59.6°C (139.28°F)

OK:

The display is as specified in the normal condition column.

Result

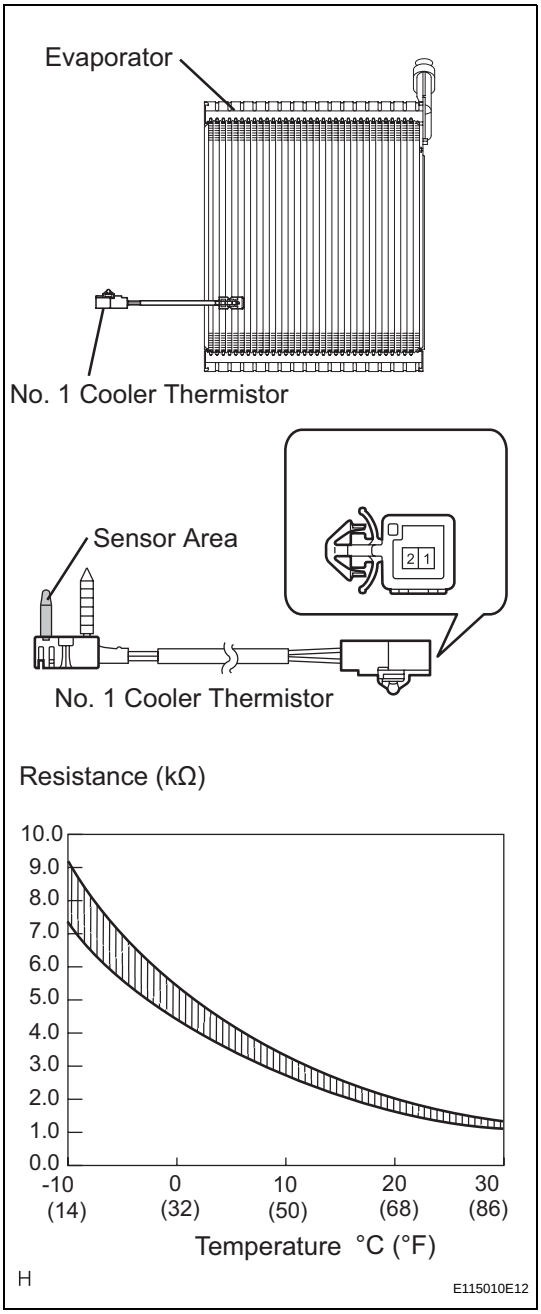
Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

2 INSPECT NO. 1 COOLER THERMISTOR (EVAPORATOR TEMPERATURE SENSOR)



(a) Remove the No. 1 cooler thermistor.

(b) Measure the resistance of the thermistor.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	-10°C (14°F)	7.30 to 9.10 kΩ
1 - 2	-5°C (23°F)	5.65 to 6.95 kΩ
1 - 2	0°C (32°F)	4.40 to 5.35 kΩ
1 - 2	5°C (41°F)	3.40 to 4.15 kΩ
1 - 2	10°C (50°F)	2.70 to 3.25 kΩ
1 - 2	15°C (59°F)	2.14 to 2.58 kΩ
1 - 2	20°C (68°F)	1.71 to 2.05 kΩ
1 - 2	25°C (77°F)	1.38 to 1.64 kΩ
1 - 2	30°C (86°F)	1.11 to 1.32 kΩ

NOTICE:

- **Touching the thermistor even slightly may change the resistance value. Be sure to hold the connector of the thermistor.**
- **When measuring, the thermistor temperature must be the same as the ambient temperature.**

HINT:

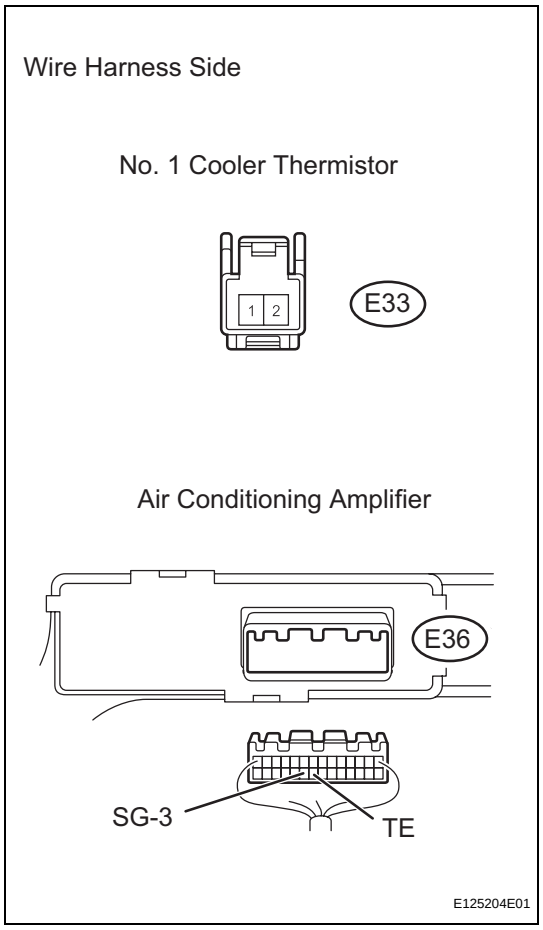
As the temperature increases, the resistance decreases (see the graph).

NG → **REPLACE NO. 1 COOLER THERMISTOR**

OK

AC

3	**CHECK WIRE HARNESS (NO. 1 COOLER THERMISTOR - AIR CONDITIONING AMPLIFIER)**



(a) Disconnect the E33 No. 1 cooler thermistor connector.
(b) Disconnect the E36 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
E33-1 - E36-22 (TE)	Below 1 Ω
E33-2 - E36-23 (SG-3)	Below 1 Ω
E33-1 - Body ground	1 MΩ or higher
E33-2 - Body ground	1 MΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER

AC

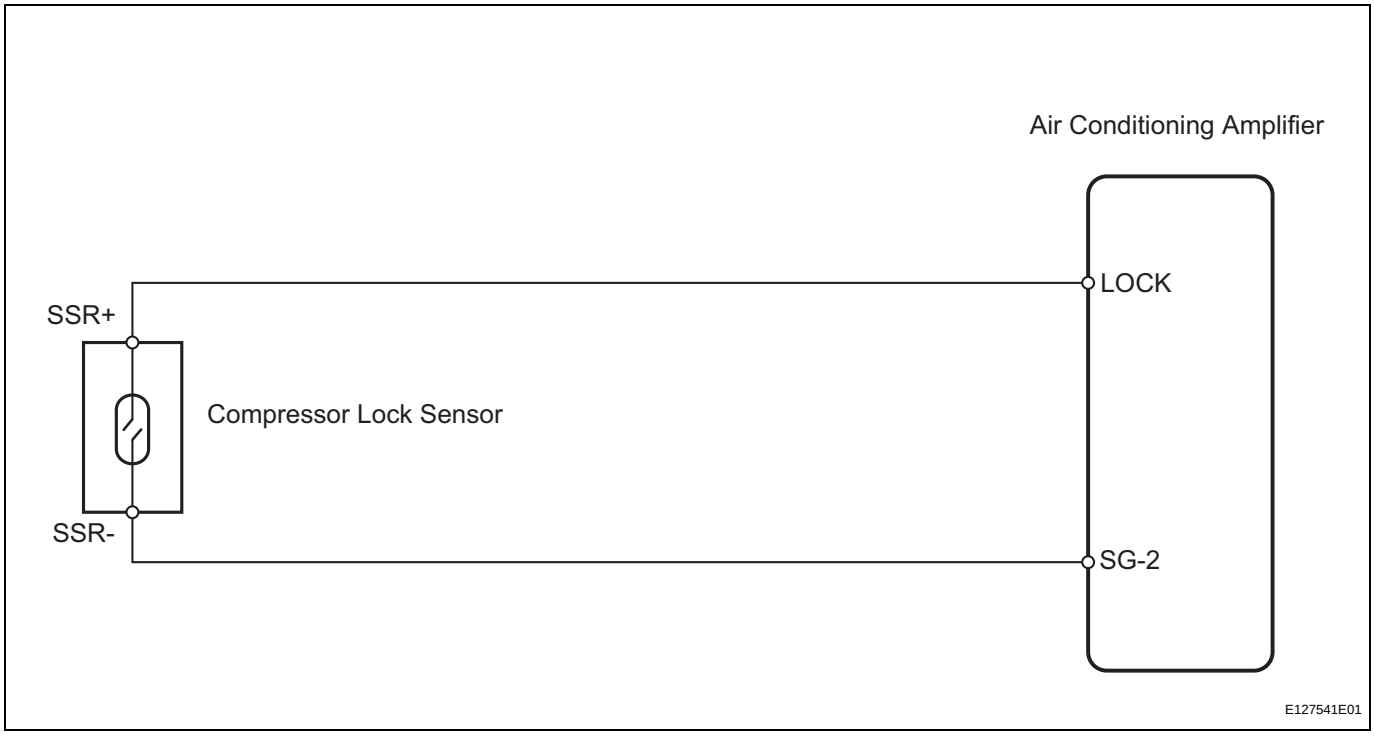
DTC	B1422/22	Compressor Lock Sensor Circuit

DESCRIPTION

This sensor sends 1 pulse per engine revolution to the air conditioning amplifier. If the ratio of the compressor speed divided by the engine speed is smaller than a predetermined value, the air conditioning amplifier turns the compressor off, and the indicator blinks at approximately 1 second intervals.

DTC No.	DTC Detection Condition	Trouble Area
B1422/22	Open or short in compressor lock sensor circuit All conditions below are detected for 3 seconds or more: 1. Engine speed: 450 rpm or more 2. Ratio between engine and compressor speed deviates 20% or more in comparison to normal operation	• Compressor and magnetic clutch • Compressor and magnetic clutch drive belt • Compressor lock sensor • Wire harness between compressor lock sensor and air conditioning amplifier • Air conditioning amplifier

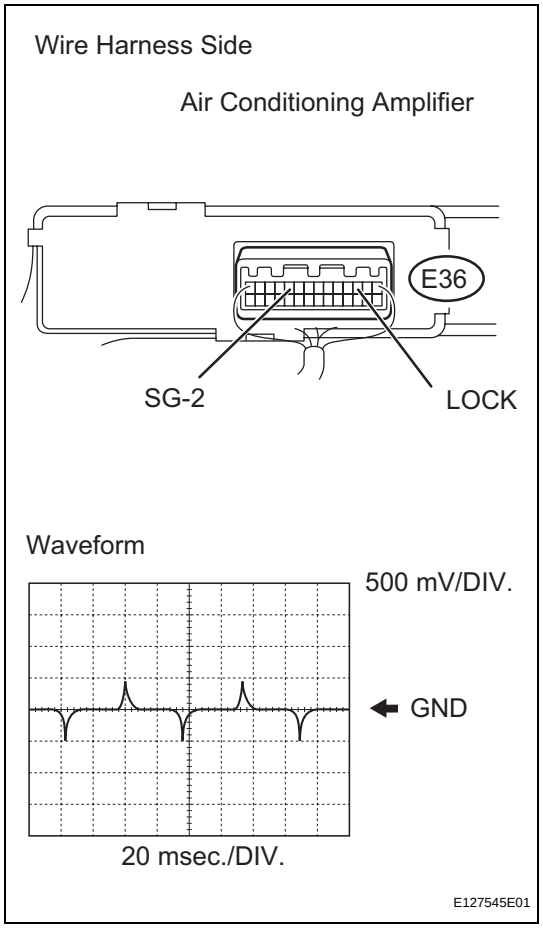
WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	CHECK AIR CONDITIONING AMPLIFIER (LOCK SIGNAL)



(a) Remove the air conditioning amplifier with its connectors still connected.

(b) Check the waveform of the amplifier connector.

OK:

Waveform is as shown in the illustration.

Item	Content
Tester Connection	LOCK (E36-3) - SG-2 (E36-10)
Tool Setting	500 mV/DIV., 20 msec./DIV.
Condition	Ignition switch ON A/C switch ON Magnetic clutch ON

AC

Result

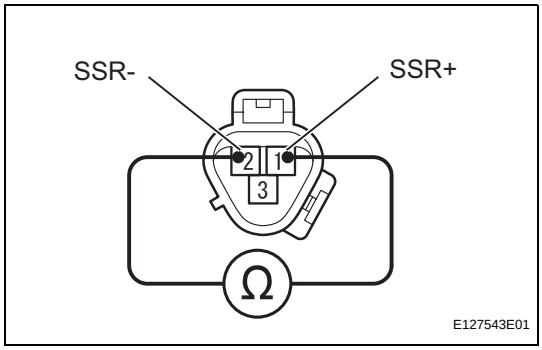
Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

2 INSPECT COMPRESSOR LOCK SENSOR



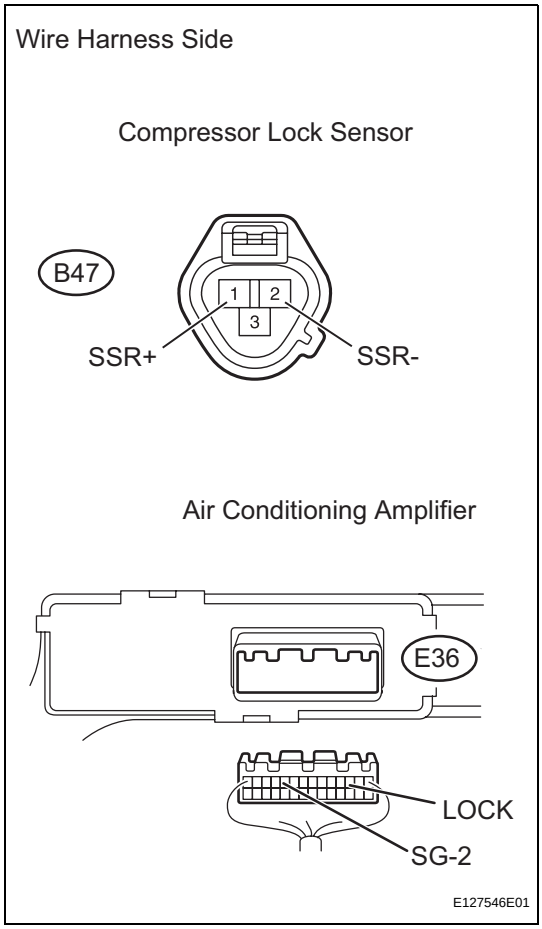
(a) Disconnect the B47 compressor lock sensor connector.
(b) Measure the resistance of the sensor.
Standard resistance

Tester Connection	Condition	Specified Condition
1 (SSR+) - 2 (SSR-)	20°C (68°F)	65 to 125 Ω

NG → **REPLACE COMPRESSOR LOCK SENSOR**

OK

3 CHECK WIRE HARNESS (COMPRESSOR LOCK SENSOR - AIR CONDITIONING AMPLIFIER)



(a) Disconnect the B47 compressor lock sensor connector.
(b) Disconnect the E36 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
B47-1 (SSR+) - E36-3 (LOCK)	Below 1 Ω
B47-2 (SSR-) - E36-10 (SG-2)	Below 1 Ω
B47-1 (SSR+) - E36-10 (SG-2)	10 kΩ or higher
E36-3 (LOCK) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER

AC

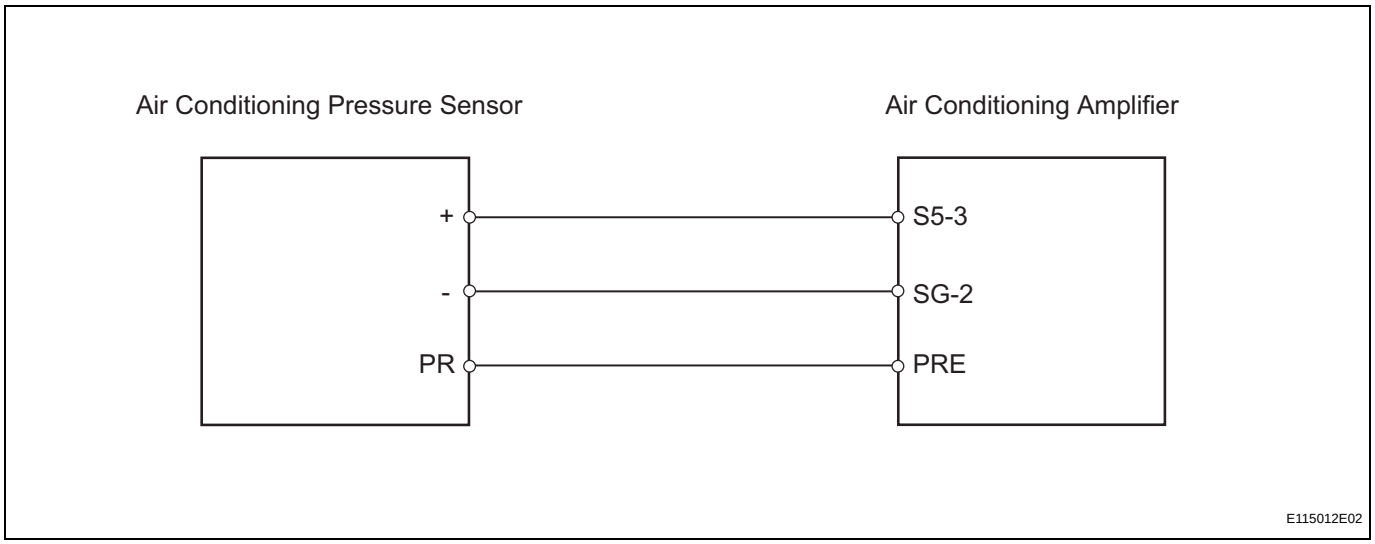
DTC	B1423/23	Pressure Sensor Circuit

DESCRIPTION

This DTC is output when the refrigerant pressure is either extremely low (0.19 MPa [2.0 kgf/cm^2, 28 psi] or less) or extremely high (3.14 MPa [32.0 kgf/cm^2, 455 psi] or more). The air conditioning pressure sensor, which is installed on the pipe of the high pressure side, detects the refrigerant pressure and sends refrigerant pressure signals to the air conditioning amplifier. The air conditioning amplifier determines the pressure from the signals in accordance with the sensor characteristics, and controls the compressor accordingly.

DTC No.	DTC Detection Condition	Trouble Area
B1423/23	Open or short in air conditioning pressure sensor circuit	• Air conditioning pressure sensor • Harness and connector between air conditioning pressure sensor and air conditioning amplifier • Air conditioning amplifier

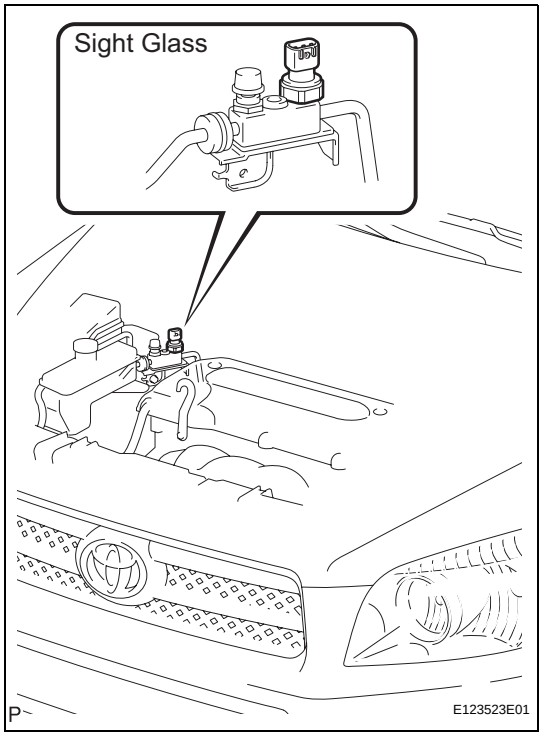
WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	CHECK REFRIGERANT



(a) Check the sight glass of the cooler unit refrigerant liquid pipe.

(1) Prepare the vehicle in accordance with the chart below.

Item	Condition
Engine Speed	1,500 rpm
Vehicle Doors	Fully open
Temperature Setting	MAX COLD
Blower Speed	HI
A/C Switch	ON

(2) Compare the sight glass to the following chart.

Item	Symptom	Amount of Refrigerant	Corrective Procedures
1	Bubbles visible	Insufficient*	1. Check for gas leakage and repair if necessary 2. Add refrigerant until bubbles disappear
2	No bubbles visible	Empty, insufficient or too much	Refer to items 3 and 4
3	No temperature difference between compressor inlet and outlet	Empty or nearly empty	1. Check for gas leakage with gas leak detector and repair if necessary 2. Add refrigerant until bubbles disappear
4	Considerable temperature difference between compressor inlet and outlet	Correct or too much	Refer to items 5 and 6
5	Refrigerant becomes clear immediately after A/C turned OFF	Too much	1. Drain or discharge refrigerant 2. Bleed air and supply proper amount of purified refrigerant
6	Refrigerant foams and then becomes clear immediately after A/C turned OFF	Correct	-

HINT:
*: If the ambient temperature is higher than usual but cooling is sufficient, bubbles in the sight glass are permissible.

NG → CHARGE REFRIGERANT

OK

AC

2	READ VALUE OF INTELLIGENT TESTER (REG PRESS SENS)

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch ON and turn the intelligent tester main switch ON.
(c) Select the item below in the DATA LIST, and read the value displayed on the intelligent tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
REG PRESS SENS	Regulator pressure sensor / Min.: 0 MPaG Max.: 3.187 MPaG	Actual regulator pressure is displayed	-

OK:

The display is as specified in the normal condition column.

Result

Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

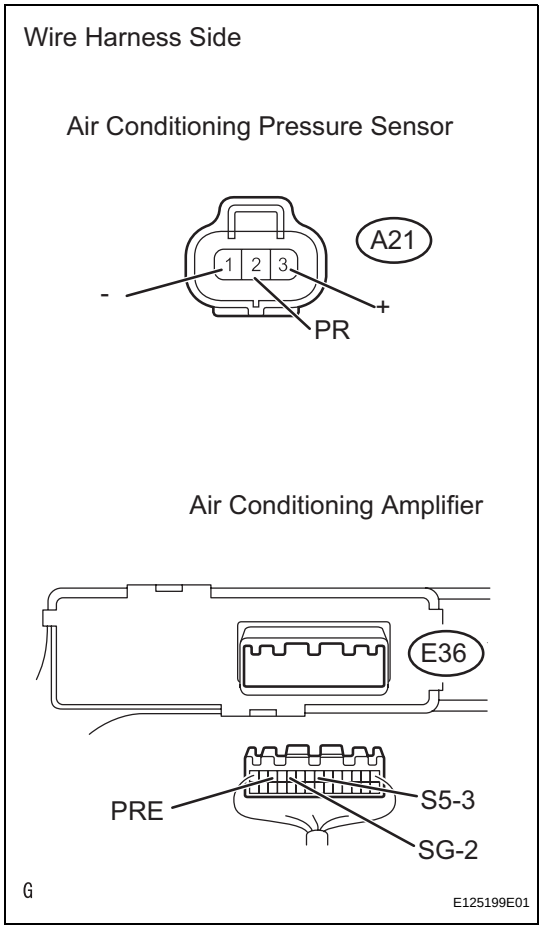
B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

AC

3 CHECK WIRE HARNESS (PRESSURE SENSOR - AIR CONDITIONING AMPLIFIER)



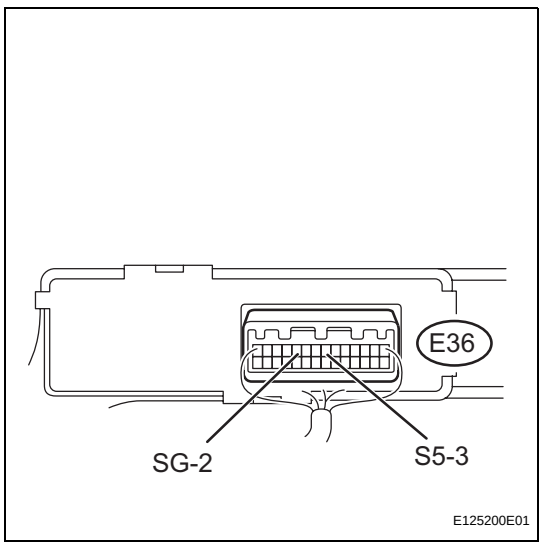
(a) Disconnect the A21 pressure sensor connector.
(b) Disconnect the E36 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
A21-3 (+) - E36-7 (S5-3)	Below 1 Ω
A21-2 (PR) - E36-12 (PRE)	Below 1 Ω
A21-1 (-) - E36-10 (SG-2)	Below 1 Ω
A21-3 (+) - Body ground	1 MΩ or higher
A21-2 (PR) - Body ground	1 MΩ or higher
A21-1 (-) - Body ground	1 MΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4 CHECK AIR CONDITIONING AMPLIFIER



(a) Remove the air conditioning amplifier with its connectors still connected.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
E36-10 (SG-2) - Body ground	Below 1 Ω

(c) Turn the ignition switch ON.
(d) Measure the voltage of the wire harness side connector.
Standard voltage

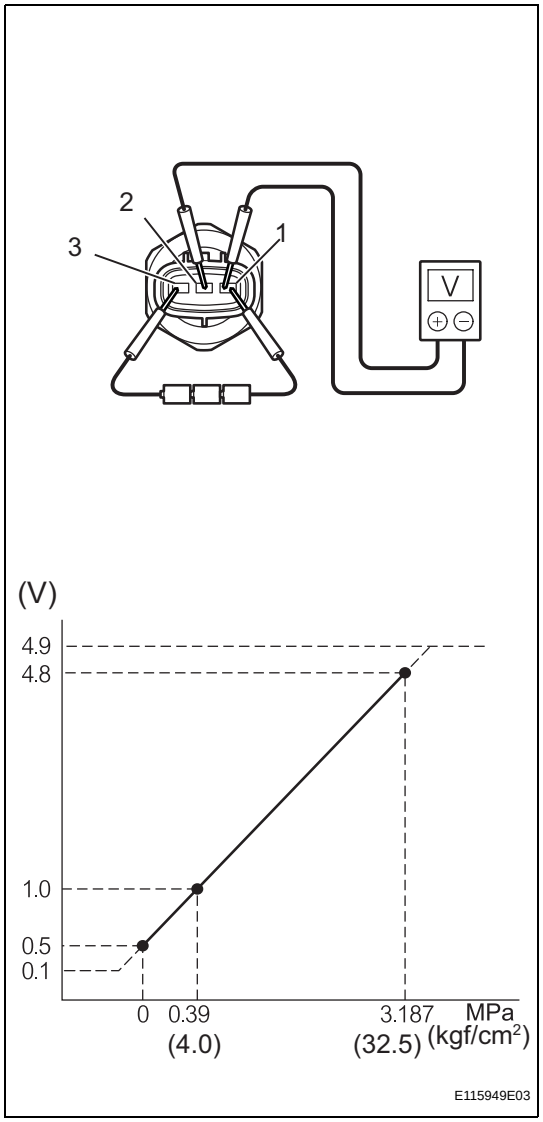
Tester Connection	Specified Condition
E36-7 (S5-3) - E36-10 (SG-2)	4.5 to 5.5 V

NG → **REPLACE AIR CONDITIONING AMPLIFIER**

OK

AC

5	**INSPECT AIR CONDITIONING PRESSURE SENSOR**



(a) Turn the A/C switch ON.
(b) Disconnect the A21 sensor connector.
(c) Connect the three 1.5 V dry cell batteries' positive (+) lead to terminal 3 and the negative (-) lead to terminal 1. Then connect the voltmeter's positive (+) lead to terminal 2 and the negative (-) lead to terminal 1. Measure the voltage.

OK:

The voltage changes in accordance with the refrigerant pressure as shown in the graph.

NG → **REPLACE AIR CONDITIONING PRESSURE SENSOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER

AC

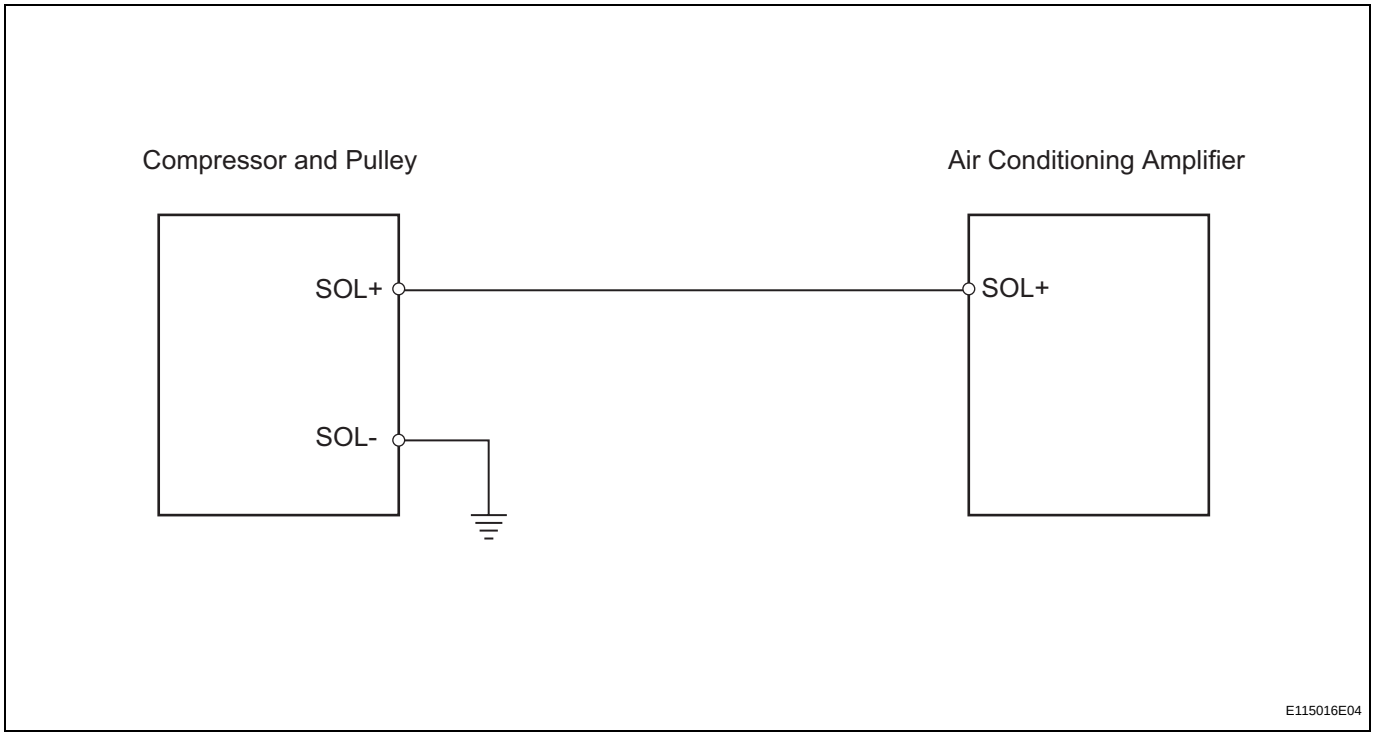
DTC	B1451/51	**Compressor Solenoid Circuit** (2005/11-2006/01)

DESCRIPTION

In this circuit, the compressor receives a refrigerant compression demand signal from the air conditioning amplifier. Based on this signal, the compressor changes the degree of refrigerant compression.

DTC No.	DTC Detection Condition	Trouble Area
B1451/51	Open or short in solenoid of externally changeable compressor circuit	• Compressor and pulley • Harness and connector between air conditioning amplifier and compressor and pulley • Air conditioning amplifier

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER (REG CTRL CURRNT)

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch ON and turn the intelligent tester main switch ON.
(c) Select the items below in the DATA LIST, and read the value displayed on the intelligent tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
REG CTRL CURRNT	Regulator control current / Min.: 0 A Max.: 0.997 A	Value changes between 0 A and 0.997 A in accordance with compressor and magnetic clutch operation	-

OK:

The display is as specified in the normal condition column.

Result

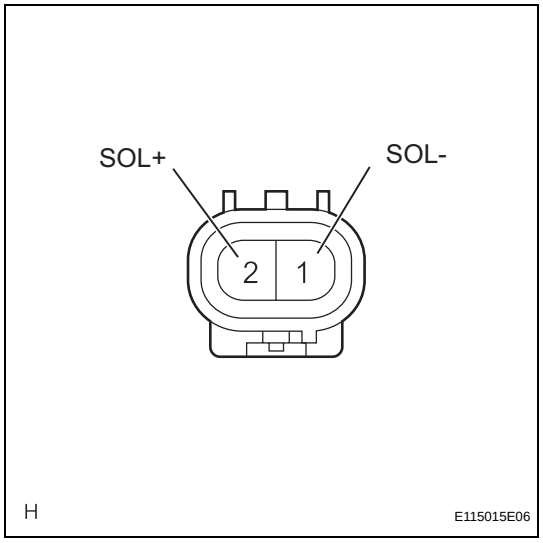
Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

2 INSPECT COMPRESSOR AND PULLEY



(a) Disconnect the compressor and pulley connector.

(b) Measure the resistance of the connector.

Standard resistance

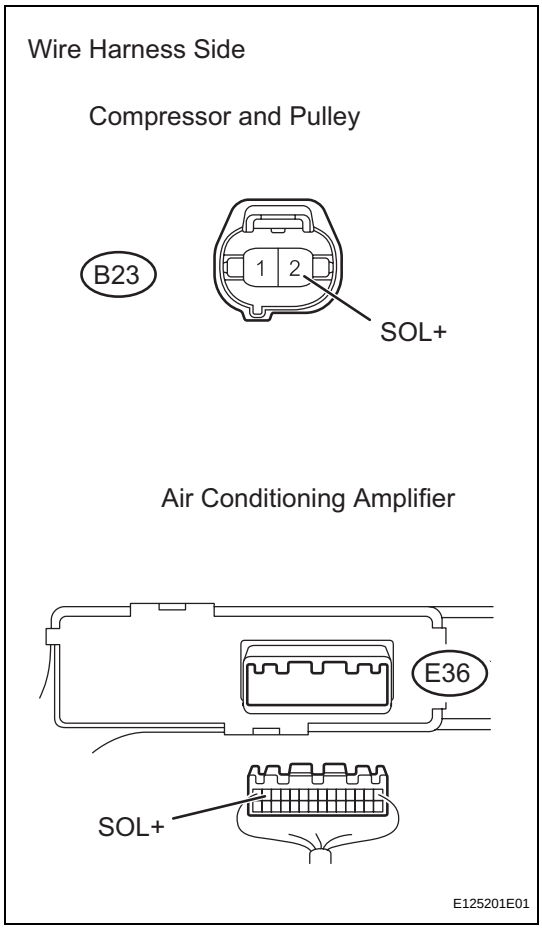
Tester Connection	Condition	Specified Condition
1 (SOL-) - 2 (SOL+)	25°C (77°F)	10.1 to 11.1 Ω

NG → **REPLACE COMPRESSOR AND PULLEY**

OK

AC

3	CHECK WIRE HARNESS (COMPRESSOR AND PULLEY - AIR CONDITIONING AMPLIFIER)



(a) Disconnect the B23 compressor and pulley connector.
(b) Disconnect the E36 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.

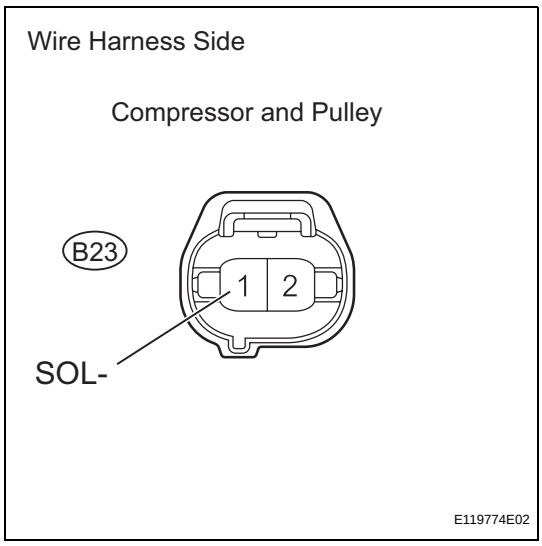
Standard resistance

Tester Connection	Specified Condition
B23-2 (SOL+) - E36-13 (SOL+)	Below 1 Ω
B23-2 (SOL+) - Body Ground	1 MΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4	CHECK WIRE HARNESS (COMPRESSOR AND PULLEY - BODY GROUND)



(a) Disconnect the B23 compressor and pulley connector.
(b) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Specified Condition
B23-1 (SOL-) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

AC

OK

REPLACE AIR CONDITIONING AMPLIFIER

DTC	B1451/51	**Compressor Solenoid Circuit** (2006/01-)

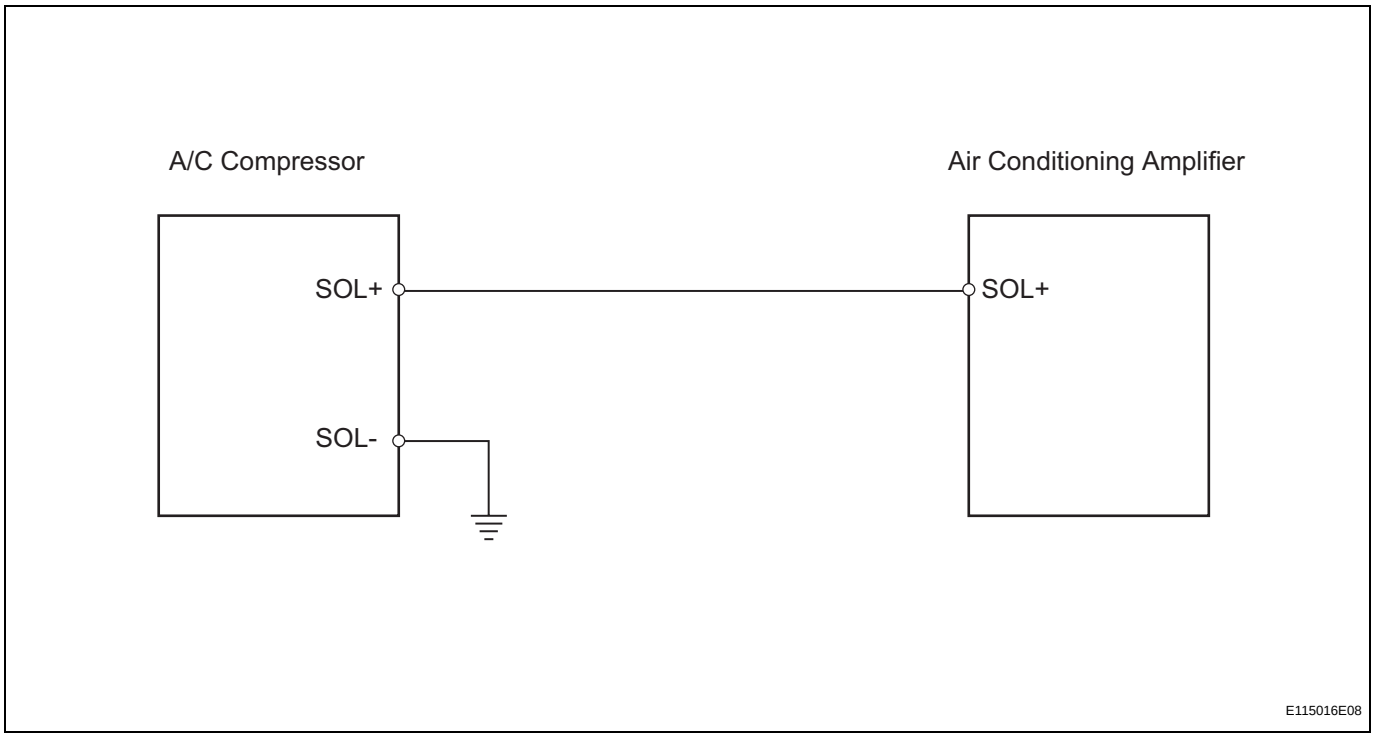
DESCRIPTION

In this circuit, the compressor receives a refrigerant compression demand signal from the air conditioning amplifier. Based on this signal, the compressor changes the degree of refrigerant compression.

DTC No.	DTC Detection Condition	Trouble Area
B1451/51	Open or short in solenoid of externally changeable compressor circuit	• A/C compressor* • Wire harness between air conditioning amplifier and A/C compressor* • Air conditioning amplifier

HINT:
*: Compressor and pulley for 2AZ-FE, compressor and magnetic clutch for 2GR-FE

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER (REG CTRL CURRNT)

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch ON and turn the intelligent tester main switch ON.
(c) Select the items below in the DATA LIST, and read the value displayed on the intelligent tester.

AC

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
REG CTRL CURRNT	Regulator control current / Min.: 0 A Max.: 0.997 A	Value changes between 0 A and 0.997 A in accordance with A/C compressor operation	-

OK:

The display is as specified in the normal condition column.

Result

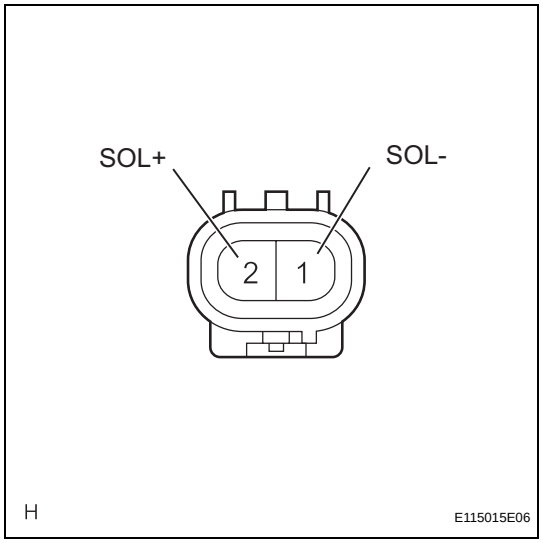
Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

2 INSPECT A/C COMPRESSOR



(a) Disconnect the A/C compressor connector.
(b) Measure the resistance of the connector.

Standard resistance

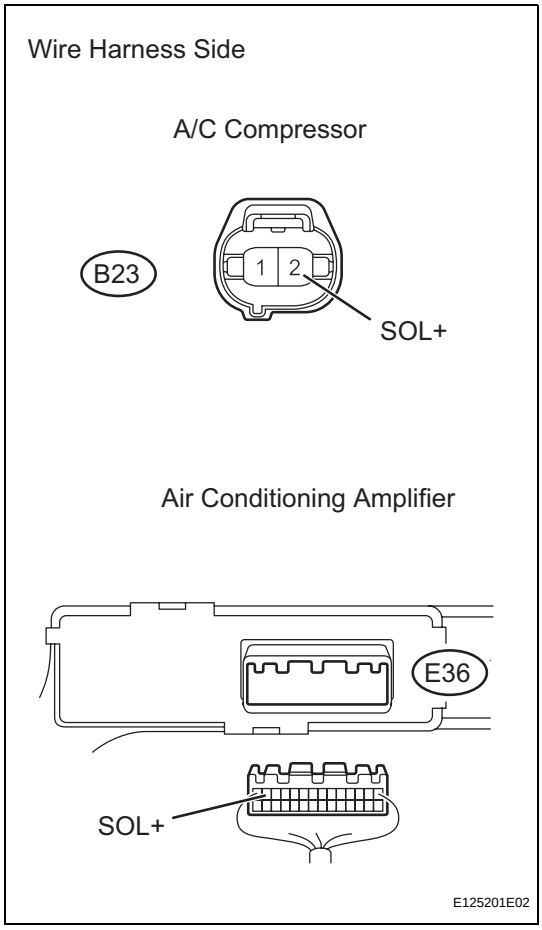
Tester Connection	Condition	Specified Condition
1 (SOL-) - 2 (SOL+)	25°C (77°F)	10.1 to 11.1 Ω

NG → **REPLACE A/C COMPRESSOR**

OK

AC

3 CHECK WIRE HARNESS (A/C COMPRESSOR - AIR CONDITIONING AMPLIFIER)



(a) Disconnect the B23 A/C compressor connector.
(b) Disconnect the E36 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.

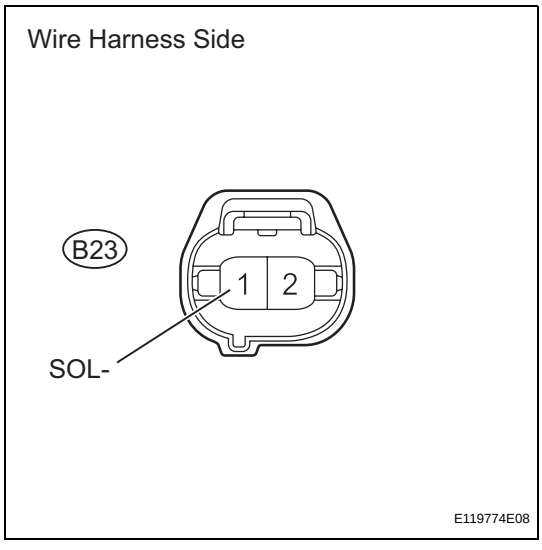
Standard resistance

Tester Connection	Specified Condition
B23-2 (SOL+) - E36-13 (SOL+)	Below 1 Ω
B23-2 (SOL+) - Body Ground	1 MΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4 CHECK WIRE HARNESS (A/C COMPRESSOR - BODY GROUND)



(a) Disconnect the B23 A/C compressor connector.
(b) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Specified Condition
B23-1 (SOL-) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

AC

OK

REPLACE AIR CONDITIONING AMPLIFIER

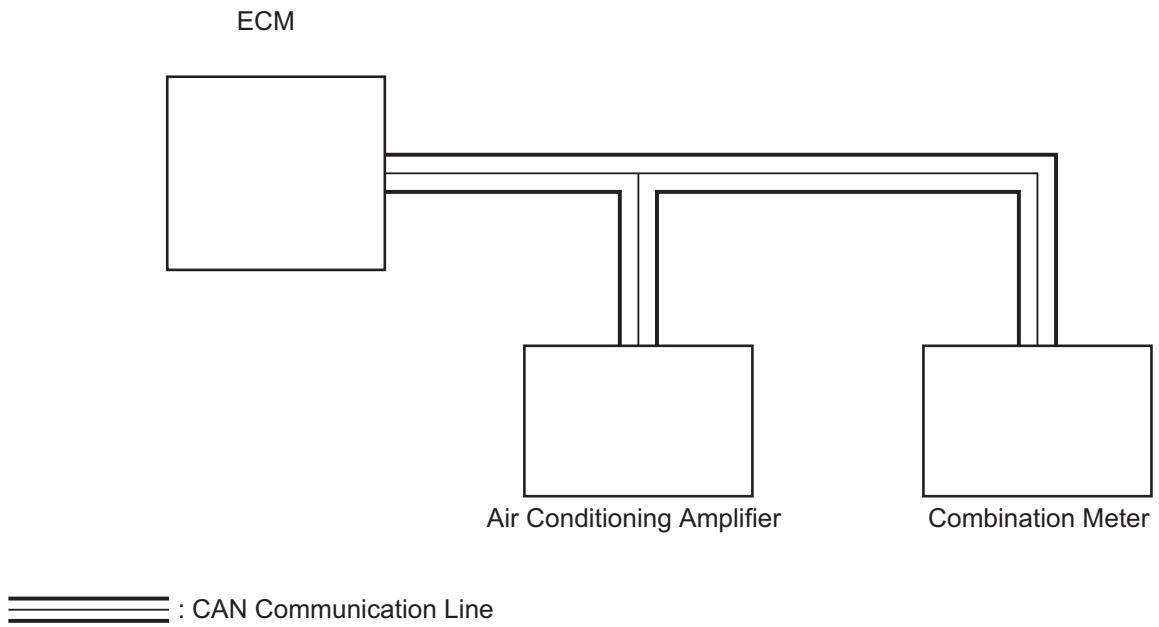
DTC	B1499/99	Multiplex Communication Circuit

DESCRIPTION

The air conditioning amplifier communicates data with the ECM and combination meter through the CAN communication system.

DTC No.	DTC Detection Condition	Trouble Area
B1499/99	Open in CAN communication line	• Air conditioning amplifier • ECM • Combination meter • CAN communication line

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	CHECK DTC

(a) Clear the DTC (see page AC-127).
(b) Read the DTC (see page AC-127).

Result

Result	Proceed to
DTC (B1499/99) is output	A (see page CA-1)
DTC (B1499/99) is not output	B

B → **SYSTEM IS OK**

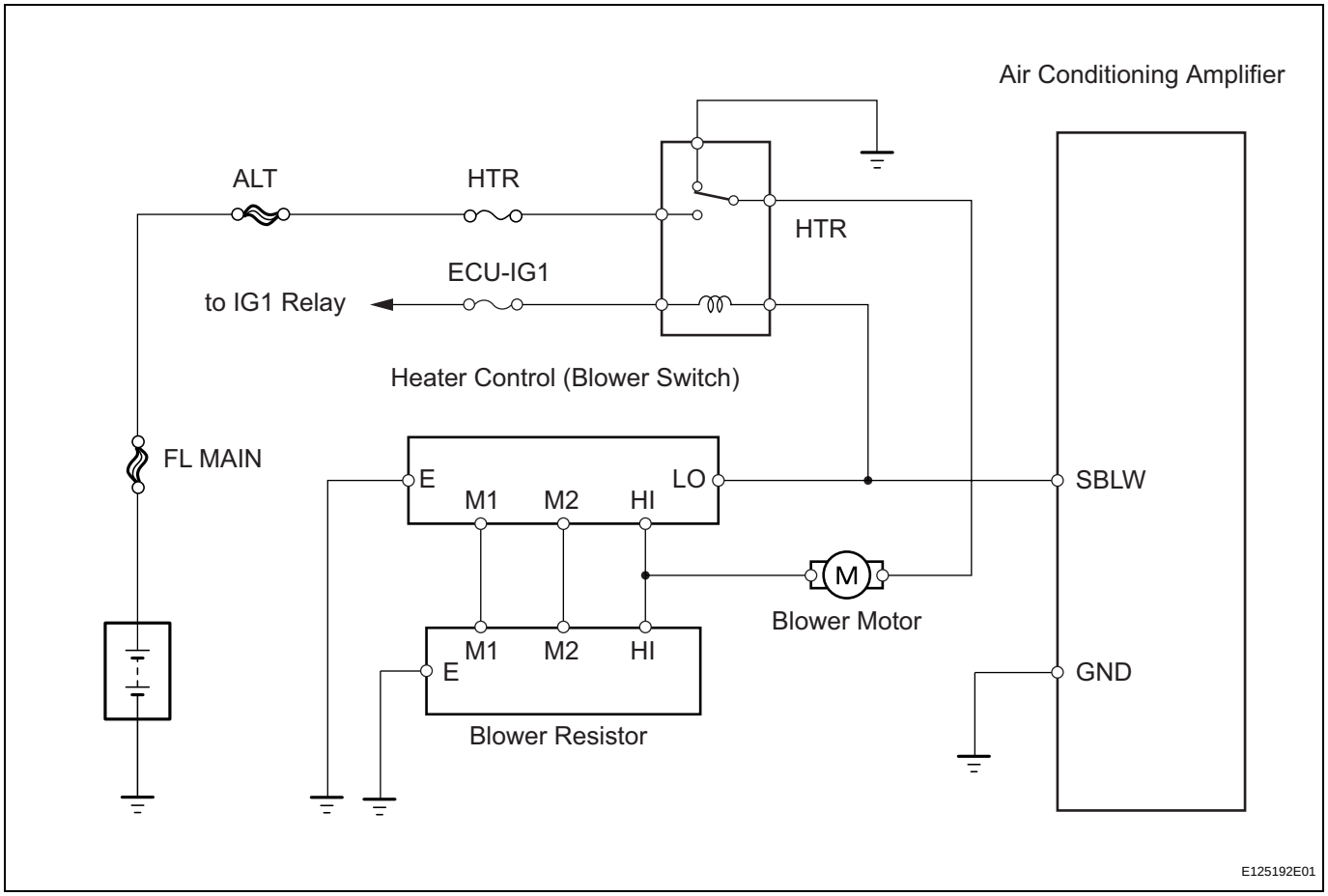
A → **GO TO CAN COMMUNICATION SYSTEM**

Blower Motor Circuit

DESCRIPTION

When the heater control (blower switch) is set to position 1 or higher, the contact of the HTR relay is closed, current flows to the blower motor, and the blower motor operates. The blower motor speed can be changed by exchanging the ground and the blower resistor circuit with the heater control (blower switch).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT FUSE (HTR)

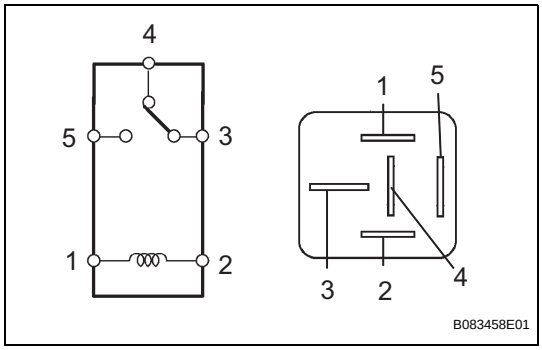
(a) Remove the HTR fuse from the engine room No. 2 relay block.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

AC

2 INSPECT HEATER RELAY (Marking: HTR)



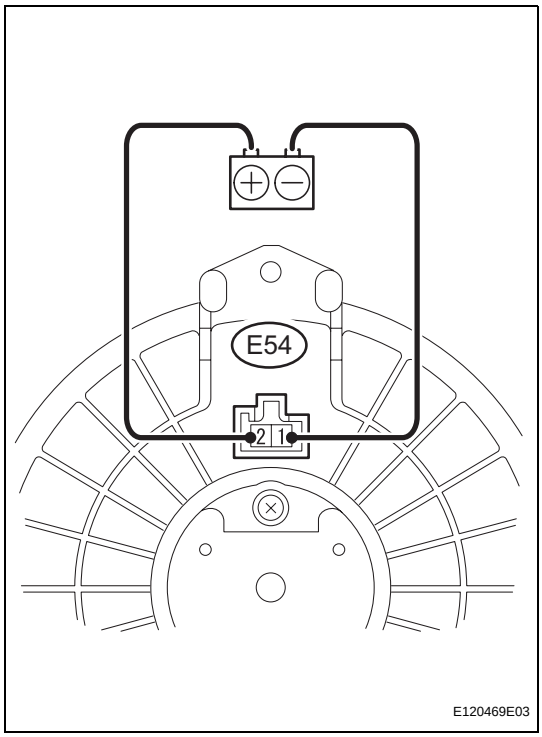
(a) Remove the heater relay from the instrument panel junction block.
(b) Measure the resistance of the relay.
Standard resistance

Tester Connection	Specified Condition
3 - 4	Below 1 Ω
3 - 5	10 kΩ or higher
3 - 4	10 kΩ or higher (when battery voltage is applied to terminals 1 and 2)
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE HEATER RELAY**

OK

3 INSPECT BLOWER MOTOR



(a) Disconnect the E54 motor connector.
(b) Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 1, then check that the blower motor operates smoothly.
OK:
The blower motor operates smoothly.
(c) Measure the current.
Standard current

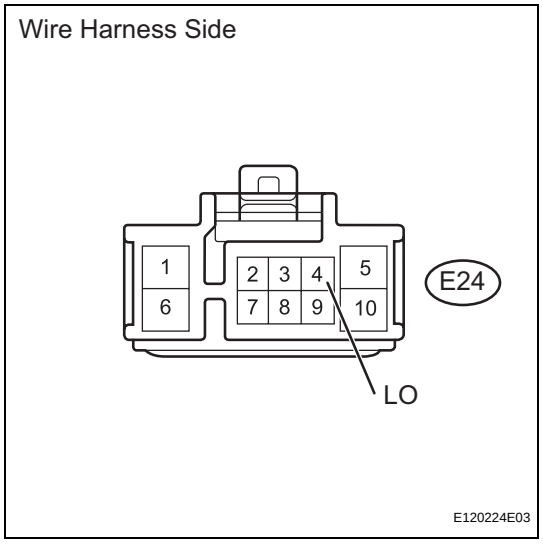
Tester Connection	Condition	Specified Condition
E54-1 - E54-2	Blower motor operates	1 to 3 A

NG → **REPLACE BLOWER MOTOR**

OK

AC

4 CHECK WIRE HARNESS (HEATER CONTROL (BLOWER SWITCH) - BATTERY)



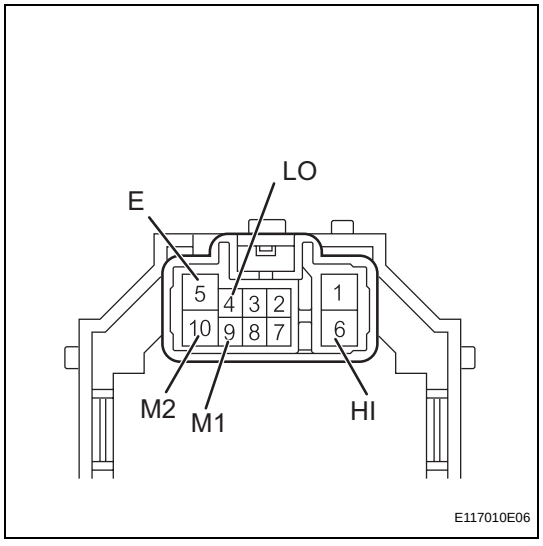
(a) Disconnect the E24 heater control connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
E24-4 (LO) - Body ground	Ignition switch ON	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5 INSPECT HEATER CONTROL (BLOWER SWITCH)



(a) Remove the heater control.
(b) Measure the resistance of the switch.
Standard resistance

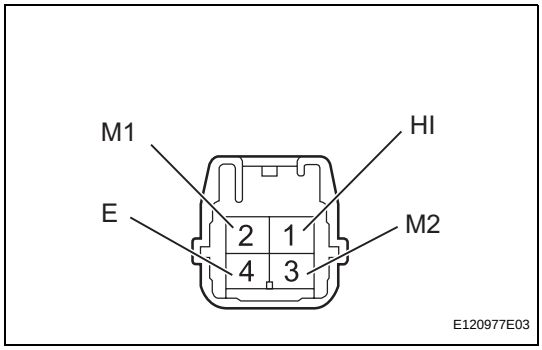
Tester Connection	Switch Position	Specified Condition
ALL - 5 (E)	0	10 kΩ or higher
4 (LO) - 5 (E)	1	Below 1 Ω
4 (LO) - 5 (E) - 9 (M1)	1 to 2	Below 1 Ω
4 (LO) - 5 (E) - 9 (M1)	2	Below 1 Ω
(LO) - (E) - 9 (M1) - 10 (M2)	2 to 3	Below 1 Ω
4 (LO) - 5 (E) - 10 (M2)	3	Below 1 Ω
4 (LO) - 5 (E) - 10 (M2) - 6(HI)	3 to 4	Below 1 Ω
4 (LO) - 5 (E) - 6 (HI)	4	Below 1 Ω

NG → **REPLACE HEATER CONTROL**

OK

AC

6 INSPECT BLOWER RESISTOR



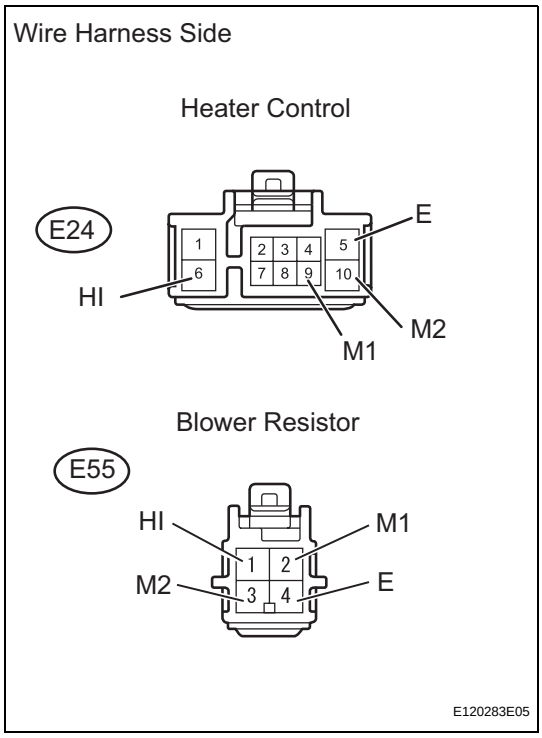
(a) Remove the blower resistor.
(b) Measure the resistance of the resistor.
Standard resistance

Tester Connection	Specified Condition
E55-4 (E) - E55-1 (HI)	3.12 to 3.60 Ω
E55-4 (E) - E55-3 (M2)	1.45 to 1.67 Ω
E55-4 (E) - E55-2 (M1)	0.52 to 0.60 Ω

NG → **REPLACE BLOWER RESISTOR**

OK

7 CHECK WIRE HARNESS (HEATER CONTROL (BLOWER SWITCH) - BLOWER RESISTOR)



(a) Disconnect the E24 heater control connector.
(b) Disconnect the E55 blower resistor connector.
(c) Measure the resistance of the wire harness side connectors.
Standard resistance

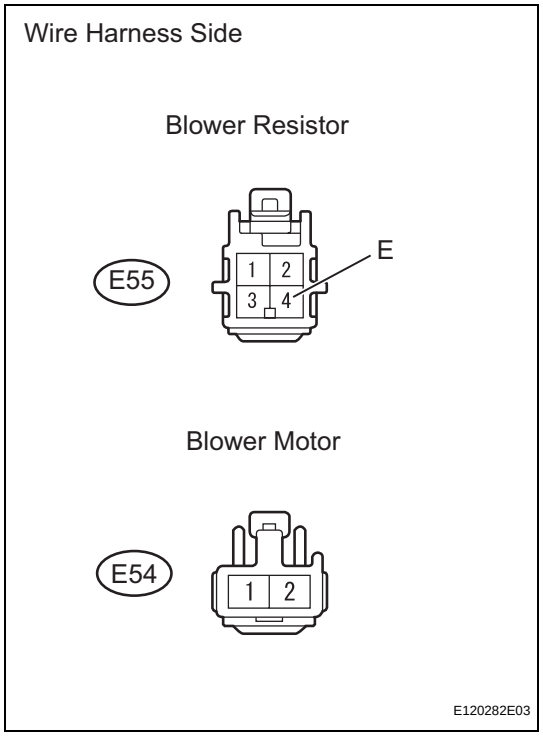
Tester Connection	Specified Condition
E24-6 (HI) - E55-1 (HI)	Below 1 Ω
E24-9 (M1) - E55-2 (M1)	Below 1 Ω
E24-10 (M2) - E55-3 (M2)	Below 1 Ω
E24-5 (E) - Body ground	Below 1 Ω
E55-4 (E) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

AC

8 CHECK WIRE HARNESS (BLOWER RESISTOR - BLOWER MOTOR)



(a) Disconnect the E55 blower resistor connector.
(b) Disconnect the E54 motor connector.
(c) Measure the resistance of the wire harness side connectors.

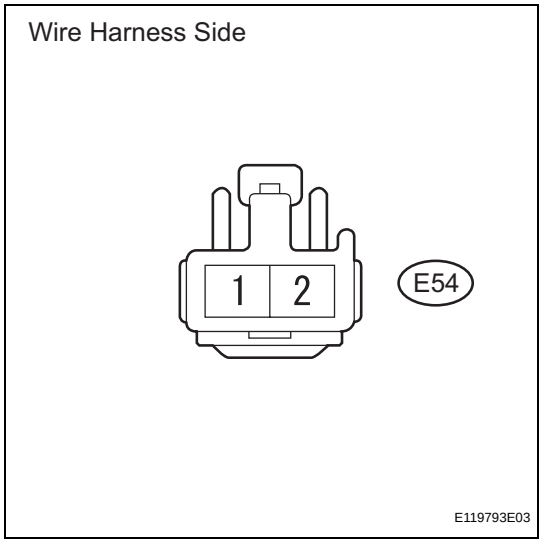
Standard resistance

Tester Connection	Specified Condition
E55-4 (E) - E54-1	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

9 CHECK WIRE HARNESS (BLOWER MOTOR - BODY GROUND)



(a) Disconnect the E54 motor connector.
(b) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Specified Condition
E54-2 - Body ground	Below 1 Ω

(c) Measure the voltage of the wire harness side connector.

Standard voltage

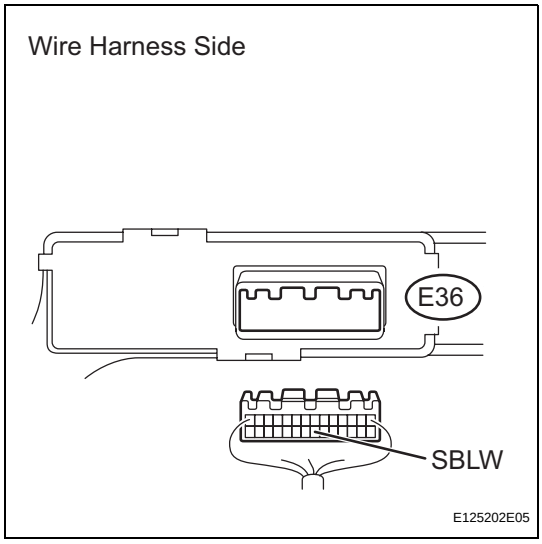
Tester Connection	Condition	Specified Condition
E54-2 - Body ground	Ignition switch ON Heater control (blower switch) 1	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

AC

10 CHECK WIRE HARNESS (AIR CONDITIONING AMPLIFIER - BATTERY)



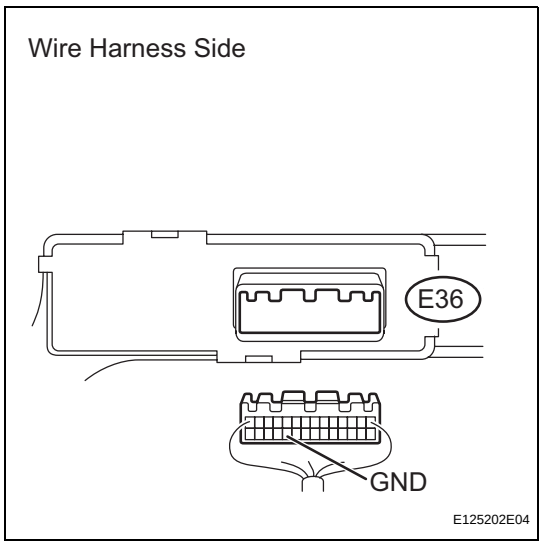
(a) Disconnect the E36 amplifier connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
E36-21 (SBLW) - Body ground	Ignition switch ON Heater control (blower switch) 0	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

11 CHECK WIRE HARNESS (AIR CONDITIONING AMPLIFIER - BODY GROUND)



(a) Disconnect the E36 amplifier connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
E36-24 (GND) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

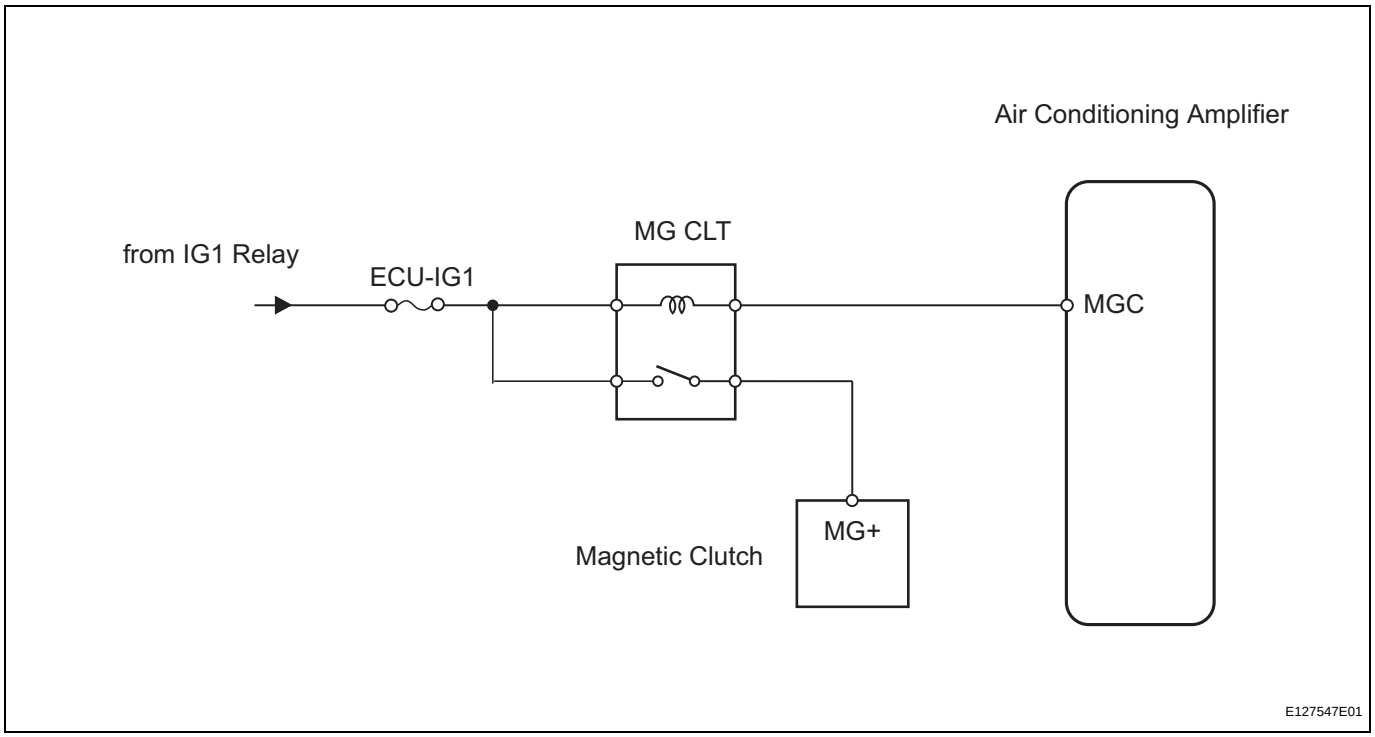
AC

Compressor Circuit

DESCRIPTION

When the A/C switch is turned on, the magnetic clutch ON signal is sent from the air conditioning amplifier. Then the MG CLT relay turns on to operate the magnetic clutch.

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (A/C MAG CLUTCH)

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch ON and turn the intelligent tester main switch ON.
(c) Select the item below in the ACTIVE TEST and then check that the compressor magnetic relay operates.

Air conditioning amplifier

Item	Test Details / Display (Range)	Diagnostic Note
A/C MAG CLUTCH	Magnetic clutch relay / OFF, ON	Operating sound can be heard

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

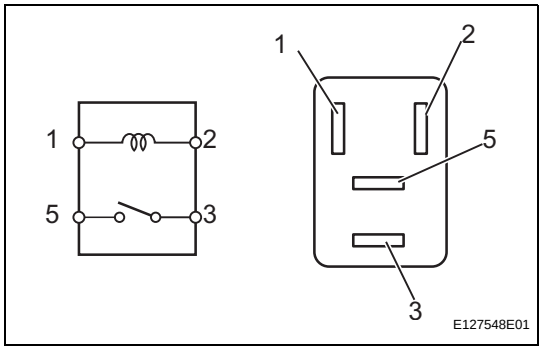
2	INSPECT FUSE (ECU-IG1)

(a) Remove the ECU-IG1 fuse from the instrument panel junction block.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

3	INSPECT MAGNETIC CLUTCH RELAY (Marking: MG CLT)



(a) Remove the magnetic clutch relay from the engine room No. 1 relay block.
(b) Measure the resistance of the relay.
Standard resistance

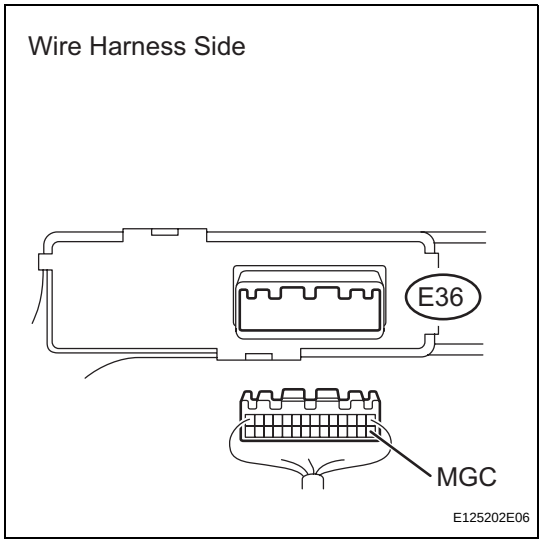
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE MAGNETIC CLUTCH RELAY**

OK

AC

4	CHECK WIRE HARNESS (AIR CONDITIONING AMPLIFIER - BATTERY)



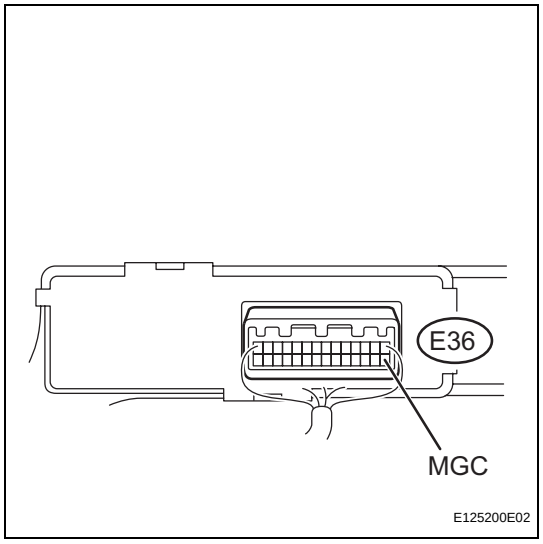
(a) Disconnect the E36 amplifier connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
E36-15 (MGC) - Body ground	Ignition switch ON	10 to 14 V
E36-15 (MGC) - Body ground	Ignition switch OFF	Below 1 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5 CHECK AIR CONDITIONING AMPLIFIER (MGC VOLTAGE)



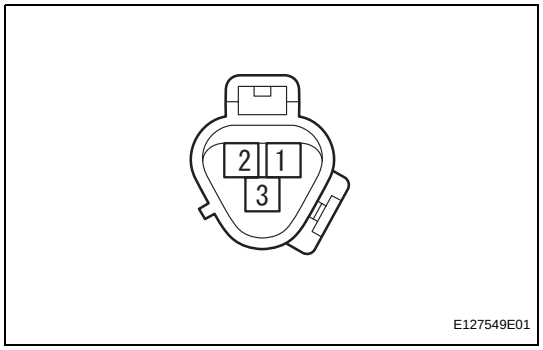
(a) Remove the air conditioning amplifier with its connectors still connected.
(b) Measure the voltage of the connector.
Standard voltage

Tester Connection	Condition	Specified Condition
E36-15 (MGC) - Body ground	Ignition switch ON A/C switch OFF	10 to 14 V
E36-15 (MGC) - Body ground	Ignition switch ON A/C switch ON	Below 1 V

NG → **REPLACE AIR CONDITIONING AMPLIFIER**

OK

6 CHECK MAGNETIC CLUTCH



(a) Disconnect the B47 magnetic clutch connector.
(b) Connect the battery's positive (+) lead to terminal 3 of the magnetic clutch and the negative (-) lead to the body ground.
OK:
Magnetic clutch is engaged.

NG → **REPLACE MAGNETIC CLUTCH**

OK

REPAIR OR REPLACE WIRE HARNESS (MAGNETIC CLUTCH - ECU-IG1)

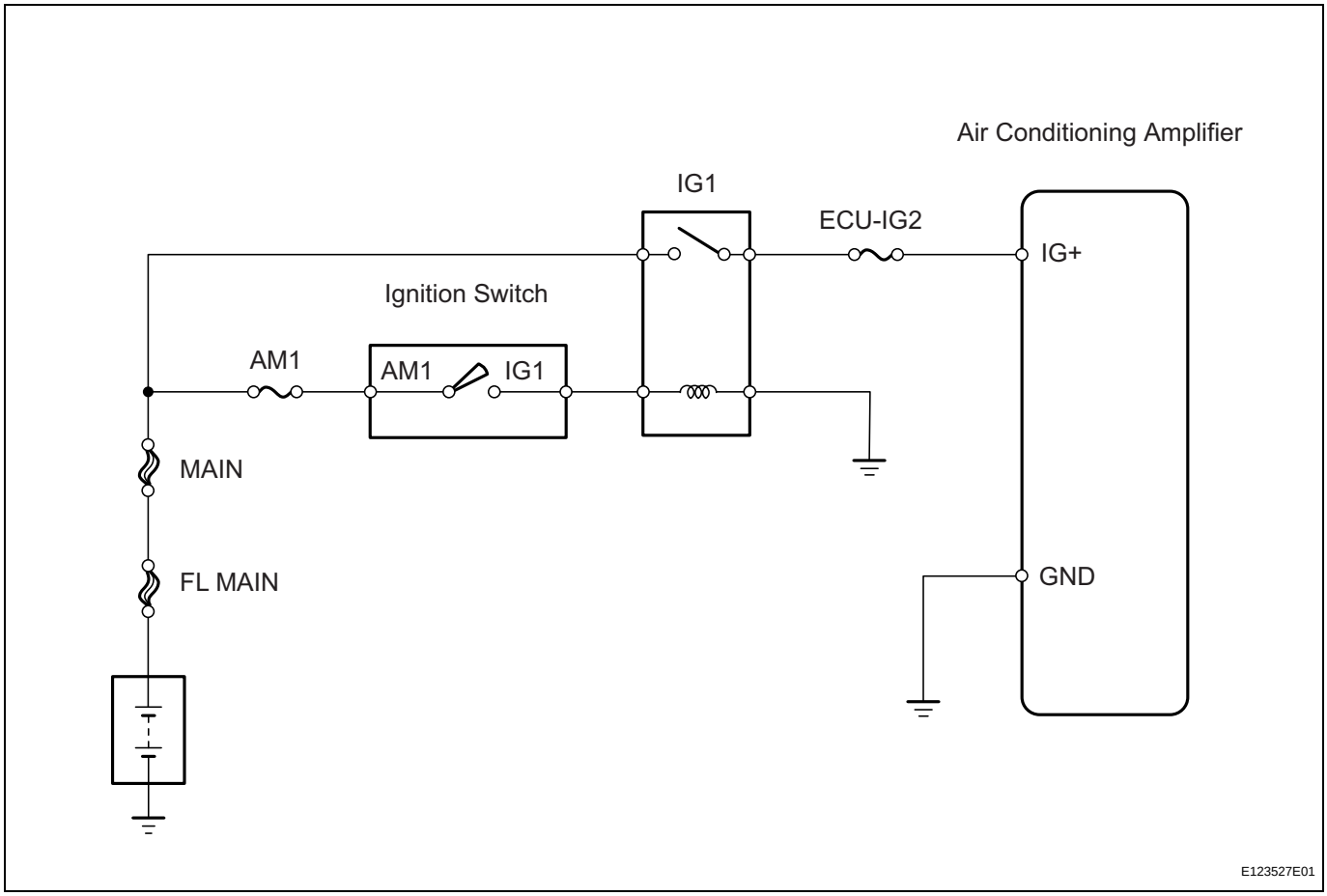
AC

IG Power Source Circuit

DESCRIPTION

This is the main power source supplied to the air conditioning amplifier when the ignition switch is ON. This power source is used for operating components, such as the air conditioning amplifier and servo motors.

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

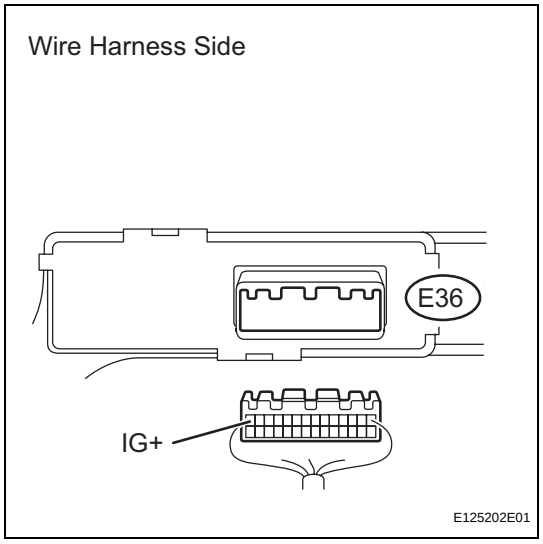
1	**INSPECT FUSE (ECU-IG2)**

(a) Remove the ECU-IG2 fuse from the instrument panel junction block.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

2 CHECK WIRE HARNESS (AIR CONDITIONING AMPLIFIER - BATTERY)



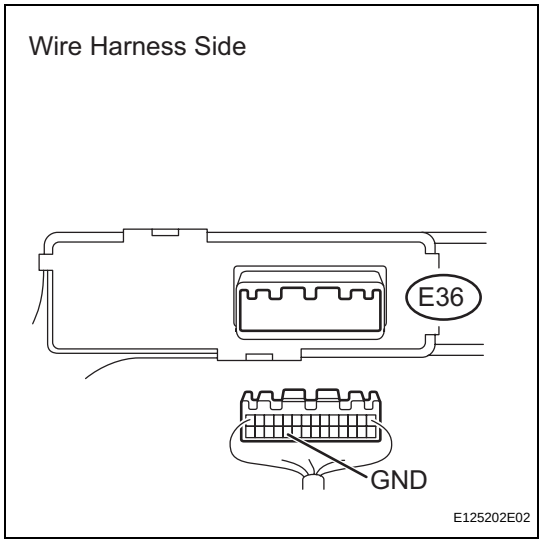
(a) Disconnect the E36 amplifier connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
E36-14 (IG+) - Body ground	Ignition switch ON	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3 CHECK WIRE HARNESS (AIR CONDITIONING AMPLIFIER - BODY GROUND)



(a) Disconnect the E36 amplifier connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
E36-24 (GND) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

AC